

Oregon

April 6, 1994

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DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

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L.T.M.

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Portland, Oregon 97201

WB

Important!!

Tim Johnson, Project Manager  
Chevron USA Products Company  
20500 Richmond Beach Drive NW  
Seattle, Washington 98177

Joe Comstock, Senior Engineer  
Unocal Oil Company  
P.O. Box 76  
Seattle, Washington 98111

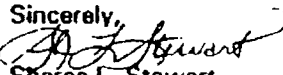
Todd Suhre, Project Manager  
Shell Oil Company  
511 N. Brookhurst St.  
Anaheim, California 92803

Re: Willbridge Bulk Fuels Area Project  
Consent Order

I have enclosed copies of the signed Consent Order between the Department of Environmental Quality (DEQ) and Chevron, Shell, and Unocal. The official date of record for the Consent Order is March 30, 1994. However, *the effective date for submittals and implementation of the Scope of Work (SOW, see Section 1) will be today's date, April 6, 1994.* Accordingly, DEQ will expect to receive notification of one project manager to represent all parties for the project implementation by June 6, 1994.

DEQ would also like to thank all of you for your cooperation and responsiveness in working through the Consent Order negotiations. Please feel free to call me at (503) 229-5413 if you have any questions or if I may be of assistance during your consultant interview/selection process.

Sincerely,

  
Sheree L. Stewart

Project Manager/Hydrogeologist  
Waste Management & Cleanup Division



cc: Kurt Burkholder, Dept. of Justice  
Thomas Miller, WMCD/SRS Manager

811 SW Sixth Avenue  
Portland, OR 97204-1390  
(503) 229-5696  
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USEPA SF



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STATE OF OREGON

DEPARTMENT OF ENVIRONMENTAL QUALITY

In the Matter of: )  
 ) DEQ No. WMCSR-NWR-94-06  
CHEVRON U.S.A. PRODUCTS COMPANY, )  
SHELL OIL COMPANY, and UNION OIL ) ORDER ON CONSENT  
COMPANY OF CALIFORNIA, )  
 )  
Respondents. )

Pursuant to ORS 465.260(4), the Director, Oregon Department of Environmental Quality ("DEQ"), issues this Order on Consent ("Consent Order") to Chevron U.S.A. Products Company, Shell Oil Company, and Union Oil Company of California, collectively referred to as "Respondents" unless otherwise noted. This Consent Order contains the following provisions:

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1. Purpose

The mutual objective of DEQ and Respondents is to determine the nature and extent of releases of hazardous substances at or from Respondents' facilities and to develop, evaluate, and select remedial measures, if necessary, in accordance with ORS 465.200 through 465.420 and regulations promulgated thereto.

2. Stipulations

Respondents consent and agree:

- A. To issuance of this Consent Order;
  - B. To perform and comply with all provisions of this Consent Order;
  - C. In any proceeding brought by DEQ to enforce this Consent Order, not to challenge DEQ's jurisdiction to issue and enforce this Consent Order;
  - D. In any proceeding brought by DEQ to enforce this Consent Order, not to litigate any issue other than Respondents' compliance with this Consent Order;
  - E. To waive any right Respondents might have under ORS 465.260(7) to seek reimbursement from the Hazardous Substance Remedial Action Fund of costs incurred under this Consent Order, except as provided under Paragraph 7.K.(3) of this Consent Order;
- and

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F. To waive any right Respondents might have to seek judicial or administrative review of this Consent Order, except in connection with any action by DEQ to enforce this Consent Order.

3. Findings of Fact

DEQ makes the following findings without admission of any such facts by Respondents:

A. Chevron U.S.A. Products Company ("Chevron") owns and operates a petroleum storage and distribution plant located at 5531 NW Doane Avenue, Portland, Oregon. Shell Oil Company ("Shell") owns and operates a petroleum storage and distribution plant located at 5880 NW St. Helens Road, Portland, Oregon. Union Oil Company of California, dba Unocal ("Unocal") owns and operates a petroleum storage and distribution plant located at 5528 NW Doane Avenue, Portland, Oregon.

B. The location of Respondents' plants is generally described on Attachment A to this Consent Order. For purposes of this Consent Order, Respondents' respective plants are collectively referred to as the "Willbridge facilities" unless otherwise noted. The boundaries of the investigation under this Consent Order include the plants themselves (including areas on the north side of Front Avenue), the streets between the plants, and the sediment along the shoreline of the plants and extending into the river up to fifty (50) feet from the ordinary high water mark or one hundred (100) feet from the stormwater outfalls as shown on Attachment A. This boundary may be modified based upon

results from further investigations. If investigations indicate that a plume of contamination above background levels extends onto neighboring properties, the area of the investigation may be expanded to include the area affected by the plume. DEQ will determine whether to add as a party to this Consent Order the owner of any neighboring property brought into the investigation, if there is data indicating that a release from that property has contributed to the contaminant plume.

C. The Chevron plant is an active bulk distribution terminal that has been in operation since 1911. The plant occupies an area of approximately 31 acres. Plant operations include receiving bulk products by barge, truck, ship, or rail, storage on the site in aboveground tanks, and blending and/or distribution of these products after packaging.

The Unocal plant is an active bulk distribution terminal, occupies approximately 26 acres, and has been in operation since 1908. The plant receives, stores, blends, packages, and distributes petroleum products, fuel oils, and lubricants. Historically, asphalt production occurred at the plant.

The Shell plant is an active bulk distribution terminal that has been in operation since 1914. It occupies approximately 44 acres. Shell operations at this plant include receiving, storing, blending, packaging, and distribution of petroleum products, fuel oils, and lubricants. Asphalt production activities also occurred at the site until 1985.

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D. A fairly extensive network of wells provide groundwater contamination data for the facilities. The preliminary indication is that there is free product and dissolved phase contamination from petroleum products beneath the Unocal plant and the Chevron plant, the exact nature and extent of which must await further characterization. There might be heavy metals in groundwater beneath the three plants, the exact constituents, nature, and extent of which must await further characterization. Volatile emissions from the free product in groundwater might present current and future threats to the health and safety of underground utility line workers downgradient of the Unocal and Chevron facilities. Past data also indicate that there might be DDT contamination in soil and groundwater beneath the Shell plant, the exact nature and extent of which must await further characterization. Groundwater discharges and other releases from the plants might have contaminated near-shore sediments in the Willamette River.

E. Contaminant concentrations in the groundwater might pose current and future threats to the environment and human health due to the discharge of groundwater in this area to the Willamette River. Volatile emissions from the free product in groundwater might pose current and future threats to the health and safety of sewer/service line workers downgradient of the plants.

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4. Conclusions of Law and Determinations

Based on the administrative record, and the above findings of fact, DEQ determines, without admission of any such determinations by Respondents, that:

- A. The Chevron, Shell, and Unocal terminals described above are "facilities" under ORS 465.200(6).
- B. Each Respondent is a "person" under ORS 465.200(13).
- C. Each Respondent may be liable under ORS 465.255.
- D. The substances described in Subsection 3.D. are "hazardous substances" under ORS 465.200(9).
- E. The presence of hazardous substances in soils and groundwater at the facilities constitutes a "release" into the environment under ORS 465.200(14).
- F. The activities required by this Consent Order or developed under this Consent Order are necessary to protect public health, safety, and welfare and the environment.

Based upon the above stipulations, findings of fact, conclusions of law and determinations, DEQ ORDERS:

5. Work to be Performed

A. Remedial Investigation and Feasibility Study

Respondents shall perform a remedial investigation and feasibility study ("RI/FS") satisfying OAR 340-122-080, the terms and schedules set forth in the Scope of Work ("SOW") contained in Attachment B to this Consent Order, and the terms and schedules set forth in an approved workplan. The SOW and approved workplan shall be deemed consistent with OAR 340-122-080.

B. Geographic Scope of RI/FS

(1) The RI/FS shall address contamination of soils, surface water, groundwater, and sediments within the boundaries shown on Attachment A. These boundaries may be modified based upon investigation results.

(2) Regarding waters and sediments located below the ordinary high water mark of the Willamette River, the purpose of the RI/FS is to:

(a) Identify, and develop measures to prevent, present and future releases of hazardous substances from upland portions of the Willbridge facilities; and

(b) Identify, and develop measures to remediate, existing sediments contamination resulting from releases of hazardous substances from upland portions of the Willbridge facilities, where such contaminated sediments act as a potential source of continuing releases to the Willamette River or otherwise pose a threat to human health or the environment (for example, through ingestion by fish or aquatic species).

C. Other Facilities

DEQ has initiated or will initiate environmental investigations at other facilities in the vicinity of the Willbridge facilities. DEQ will attempt to coordinate the schedule for those investigations with investigative activities at the Willbridge facilities. To the extent that results of those investigations are relevant to contamination at the Willbridge facilities, such information may be incorporated into

the RI/FS for the Willbridge facilities. DEQ also will consider the results of investigations at other facilities in determining the proper scope of any future remedial action and appropriate parties thereto.

D. Additional Measures

Respondents may elect at any time during the term of this Consent Order to undertake measures, beyond those required under this Consent Order and the SOW, necessary to address the release or threatened release of hazardous substances at the Willbridge facilities. Such additional measures shall be subject to prior approval by DEQ, which approval shall be granted if DEQ determines that the additional measures will not compromise the validity of the RI/FS or threaten human health or the environment.

6. Public Participation

A. Upon issuance of this Consent Order, DEQ will provide public notice of this Consent Order through issuance of a press release, at a minimum to a local newspaper of general circulation. Copies of the Consent Order will be made available to the public.

B. DEQ shall provide Respondents a draft of such press release and consider any comments by Respondents on the draft press release, before issuance.

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7. General Provisions

A. Access

(1) To the extent feasible and consistent with DEQ's enforcement objectives, DEQ shall give Respondents notice before entry and inspection. Respondents shall allow DEQ to enter and move freely about their respective facilities at all reasonable times for the purposes, among others, of inspecting records relating to work under this Consent Order; observing Respondents' progress in implementing this Consent Order; conducting such tests and taking such samples as DEQ deems necessary; verifying data submitted to DEQ by Respondents; and, using camera, sound recording, or other recording equipment.

(2) While on a facility, DEQ representatives shall comply with safety rules and practices identified in a health and safety plan approved by DEQ in accordance with the SOW. These requirements may include accompaniment by a facility representative to the extent necessary to health and safety and not inconsistent with DEQ's enforcement objectives.

(3) DEQ shall use its statutory authority to obtain access on behalf of Respondents to property not owned or controlled by Respondents, if DEQ determines that access is necessary and that Respondents have exhausted all good faith efforts to obtain access.

B. Project Managers

(1) For working purposes with DEQ, Respondents shall assign responsibility for project management to one person,



enabling more efficient communication and decisionmaking.

(2) To the extent possible, all reports, notices, and other communications required under or relating to this Consent Order shall be directed to:

DEQ  
Project Manager:

Sheree Stewart  
Waste Management and Cleanup  
Department of Environmental  
Quality  
811 S.W. 6th Avenue  
Portland, OR 97204  
(503) 229-5413

(3) Within sixty (60) days of signing of this Consent Order, Respondents shall designate a project manager for purposes of this Consent Order.

(4) The Project Managers shall be available and have the authority to make day-to-day decisions necessary to implement the workplan.

C. Notice and Samples

(1) Respondents shall make every reasonable attempt to notify DEQ of any excavation, drilling, or sampling to be conducted under this Consent Order at least five (5) working days before such activity but in no event less than twenty-four (24) hours before such activity. This requirement of notice does not apply to normal operations or maintenance at a facility. Upon DEQ's verbal request, Respondents shall allow DEQ to take a split and/or duplicate of any sample taken by Respondents while performing work under this Consent Order. DEQ shall provide

Respondents with copies of all analytical data from such samples as soon as practicable.

(2) In the event DEQ conducts any sampling or analysis in connection with this Consent Order, DEQ shall make every reasonable attempt to notify Respondents of any excavation, drilling, or sampling at least five (5) working days before such activity but in no event less than twenty-four (24) hours before such activity. Upon Respondents' verbal request, DEQ shall allow Respondents to take a split and/or duplicate of any sample taken by DEQ. DEQ and Respondents shall provide each other with copies of all analytical data from such samples as soon as practicable.

(3) Any notice required or permitted to be given under this Consent Order in writing shall be given by personal delivery, telephone facsimile, or certified mail. All notices shall be deemed received on the actual date of receipt as evidenced by a return receipt, or on the date of delivery, whichever is earlier. In the event notice is sent by telephone facsimile, the sender shall also mail a copy of the notice by first class mail, postage prepaid.

D. Quality Assurance

(1) Respondents shall conduct all sampling, sample transport, and sample analysis in accordance with the Quality Assurance/Quality Control ("QA/QC") provisions approved by DEQ as part of the workplan. All plans prepared and work conducted as part of this Consent Order shall be consistent with DEQ's "Environmental Cleanup Division Quality Assurance Policy No.

760.00." Respondents shall ensure that each laboratory used by Respondents for analysis performs such analyses in accordance with such provisions. Respondents shall also ensure that such laboratories analyze all samples submitted by DEQ to Respondents for QA/QC monitoring in accordance with such provisions.

(2) In the event that DEQ conducts sampling or analysis in connection with this Consent Order, DEQ shall conduct sampling, sample transport, and sample analysis in accordance with the QA/QC provisions of the approved workplan. DEQ shall provide Respondents with DEQ records regarding such sampling, transport, and analysis as soon as practicable.

E. Records

(1) In addition to those reports and documents specifically required under this Consent Order, Respondents shall provide to DEQ within ten (10) days of DEQ's written request copies of QA/QC memoranda and audits, raw data, draft and final plans, final reports, field notes, and laboratory analytical reports.

(2) Respondents and DEQ shall preserve their respective documents and information relating to work performed under this Consent Order, or relating to hazardous substances at the Willbridge facilities, for at least five (5) years after termination under Section 8 of this Consent Order. After such five-year period, Respondents and DEQ shall provide each other sixty (60) days notice before destruction or other disposal of such documents or information, and, upon one party's request, the

other party shall provide, subject to privilege or confidentiality under Paragraphs 7.E.(3) through (5), copies of such records. In complying with this provision, Respondents and DEQ need not preserve original materials but may use microfilm, electronic, or other methods of readily-retrievable information storage.

(3) Respondents shall permit DEQ to inspect and copy all records, files, photographs, documents, and data relating to work under this Consent Order, except that Respondents shall not be required to permit DEQ inspection or copying of items subject to attorney-client or attorney work product privilege.

(4) Respondents shall identify to DEQ (by addressor-addressee, date, general subject matter, and distribution) any document, record, or item withheld from DEQ on the basis of attorney-client or attorney work product privilege. DEQ reserves its rights under law to obtain documents DEQ asserts are improperly withheld by Respondents. Attorney-client and work product privileges may not be asserted with respect to any records required under Paragraph 7.E.(1) of this Consent Order, except for field notes, audit comments, or report comments made by Respondents' legal counsel or records made at the direction of Respondents' legal counsel for purposes other than implementation of this Consent Order.

(5) Respondents may further assert a claim of confidentiality under the Oregon Public Records Law regarding any documents or records submitted to or copied by DEQ pursuant to

this Consent Order. DEQ shall treat documents and records for which a claim of confidentiality has been made in accordance with ORS 192.410 through 192.505. If Respondents do not make a claim of confidentiality at the time the documents or records are submitted to or copied by DEQ, the documents or records may be made available to the public without notice to Respondents.

F. Progress Reports

During the term of this Consent Order, Respondents shall deliver quarterly progress reports to DEQ. The first progress report shall be due on the 15th day of the third month following issuance of this Consent Order, subsequent reports to be submitted every three (3) months thereafter. Each progress report shall contain:

- (1) actions taken under this Consent Order during the previous quarter;
- (2) actions scheduled to be taken in the next quarter;
- (3) sampling, test results, and any other data generated by Respondents during the previous quarter, to the extent available by the reporting date; and
- (4) a description of any problems experienced during the previous quarter and actions planned or taken to correct those problems.

G. Other Applicable Laws

All activities under this Consent Order shall be performed in accordance with all applicable federal, state, and local laws and regulations.

H. Reimbursement of DEQ Oversight Costs

(1) DEQ shall submit to Respondents' Project Manager a monthly invoice of costs incurred by DEQ after September 2, 1993 in connection with the facilities and oversight of Respondents' implementation of this Consent Order. Each invoice shall include a summary of costs billed to date. Each invoice shall have attached to it a list of all DEQ employees or consultants whose time is being charged, and a specific description of their work on the project. DEQ shall maintain work logs, payroll records, receipts, and other records to document work performed and expenses incurred under this Consent Order and, upon request, shall make such records available to Respondents for their inspection during the term of this Consent Order and for at least one (1) year thereafter.

(2) DEQ oversight costs shall include both direct costs and indirect costs. Direct costs include site-specific expenses, DEQ contractor costs, and DEQ legal costs. Indirect costs include general management and support costs of DEQ allocable to DEQ's oversight of this Consent Order and not charged as direct costs. Indirect costs are based on actual costs and calculated as a percentage of direct personal services costs. DEQ shall not charge unreasonable costs. Further, DEQ shall not charge as direct costs: (a) costs associated with training of personnel or contractors, except to the extent that such training is required by unique circumstances encountered at  
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the Willbridge facilities; or (b) costs for work or travel unrelated to the Willbridge facilities.

(3) Subject to dispute resolution under Subsection 7.K., within thirty (30) days after issuance of the monthly statement, Respondents shall pay the amount of costs billed by check made payable to the "State of Oregon, Hazardous Substance Remedial Action Fund."

I. Force Majeure

(1) If any event occurs that is beyond Respondents' reasonable control and that causes or might cause a delay or deviation in performance of the requirements of this Consent Order, Respondents shall promptly notify DEQ's Project Manager verbally of the cause of the delay or deviation, its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Respondents propose to carry out such measures. Respondents shall confirm in writing this information, within five (5) working days of the verbal notification.

(2) If Respondents demonstrate to DEQ's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the control and despite the due diligence of Respondents, DEQ shall extend times for performance of related activities under this Consent Order as appropriate. Circumstances or events beyond Respondents' control might include but are not limited to acts of God, unforeseen strikes or work stoppages, unanticipated site conditions, earthquake, flood,

fire, explosion, riot, sabotage, public enemy, delay in receiving a governmental approval or permit, delay in obtaining property access, or acts of war. Increased cost of performance or changed business or economic circumstances shall be presumed not to be circumstances beyond Respondents' control.

J. DEQ Approvals

(1) Where DEQ review and approval is required for any plan or activity under this Consent Order, Respondents shall not proceed to implement the plan or activity until DEQ approval is received. Any DEQ delay in granting or denying approval shall correspondingly extend the time for completion by Respondents. DEQ shall provide Respondents with fifteen (15) days notice before issuing comments on review or approval.

(2) After review of any plan, report, or other item required to be submitted for DEQ approval under this Consent Order, DEQ shall:

- (a) approve the submission in whole or in part; or
- (b) disapprove the submission in whole or in part and notify Respondents of deficiencies and/or request modifications to cure the deficiencies. DEQ approvals, rejections, modifications, or identification of deficiencies shall be given as soon as practicable in writing and state DEQ's reasons with reasonable specificity.

(3) In the event of disapproval or a request for modification of a submission by DEQ, Respondents shall correct the deficiencies and resubmit the revised report or other item



for approval within thirty (30) days of receipt of the DEQ notice or such other reasonable time as may be specified in the notice.

(4) In the event a deficiency identified by DEQ is not addressed by Respondents in good faith in the revised submittal, DEQ may modify the submission to cure the deficiency.

(5) In the event of approval or modification of the submission by DEQ, Respondents shall (subject to dispute resolution under Subsection 7.K. as to any DEQ modifications) implement the action(s) required by the plan, report, or other item, as so approved or modified.

K. Dispute Resolution

(1) In the event of disagreement between Respondents and DEQ regarding review and approval of a plan or activity, interpretation of data, or oversight costs, Respondents and DEQ shall provide each other their respective positions in writing regarding the disputed matter and shall make a good faith effort to resolve any disagreement, including, if necessary, face-to-face discussions at the senior supervisory level between Respondents and DEQ. Any final decision by DEQ regarding a disputed matter after such dialogue shall be provided Respondents in writing and shall be an enforceable part of this Consent Order.

(2) Within five (5) working days of the initial disagreement, as an alternative to procedures under Paragraph (1) of this subsection, Respondents and DEQ upon mutual agreement may request an independent review of any dispute by a qualified,

mutually-acceptable, and neutral third party ("Third Party"). Within ten (10) working days after selection of the Third Party, Respondents and DEQ shall provide the Third Party with an agreed-upon statement of the nature of the dispute and a copy of the dispute resolution procedures to be followed by the Third Party. Within the same ten-day period, Respondents and DEQ shall provide the Third Party (with copies to each other) their respective positions regarding the dispute and the rationale, information, and documents supporting such position. Within thirty (30) days of the parties' submissions to the Third Party, or within such other time period as agreed to by the parties and the Third Party, the Third Party shall provide Respondents and DEQ a written advisory report setting forth the Third Party's determination regarding the dispute. DEQ shall consider the advisory report in making a final decision regarding the disputed matter. The advisory report shall not be binding on DEQ; provided, the advisory report shall be admissible in any action commenced by DEQ to enforce this Consent Order or to assess penalties regarding the disputed matter. DEQ's final decision shall be enforceable under the terms of this Consent Order. The fees and expenses of the Third Party shall be borne one half by Respondents and one half by DEQ.

(3) If Respondents perform a plan or activity or pay oversight costs in accordance with DEQ's final decision after the plan, activity, or oversight costs were disputed by Respondents in good faith under this subsection, Respondents may seek

reimbursement under ORS 465.260(7) for their costs of performing the increment of the plan or activity or payment of the oversight costs that Respondents would not otherwise have performed or paid but for DEQ's decision.

L. Stipulated Penalties

(1) Subject to Subsections 7.I., 7.J., and 7.K., upon any violation by Respondents of any provision of this Consent Order, and upon Respondents' receipt from DEQ of written notice of violation, Respondents shall pay the stipulated penalties set forth in the following schedule:

(a) Up to \$5,000 for the first week of violation or delay and up to \$5,000 per day of violation or delay thereafter, for failure to allow DEQ access as required under Subsection 7.A. or to provide records as required under Subsection 7.E.

(b) Up to \$5,000 for the first week of violation or delay (but not exceeding \$2,000 for any one day during the first week) and up to \$2,000 per day of violation or delay thereafter, for:

(i) Failure to submit a final workplan, addressing in good faith DEQ's comments on the draft workplan, in accordance with the Scope of Work's schedule and terms;

(ii) Failure to complete work in accordance with an approved workplan's schedule and terms; or

(iii) Failure to submit a final report, addressing in good faith DEQ's comments on the draft report, in accordance with the approved workplan's schedule and terms.

(c) Up to \$500 for the first week of violation or delay and up to \$500 per day of violation or delay thereafter, for:

(i) Failure to submit a good faith draft workplan in accordance with the Scope of Work's schedule and terms;

(ii) Failure to submit good faith progress reports in accordance with the Consent Order's schedule and terms; or

(iii) Any other material violation of the Consent Order or approved workplan.

(2) Within thirty (30) days of receipt of DEQ's written notice of violation, Respondents shall pay the amount of such stipulated penalty by check made payable to the "State of Oregon, Hazardous Substance Remedial Action Fund," or request a contested case in accordance with Paragraph (3) of this subsection. Respondents shall pay interest of 9 percent (9%) per annum on the unpaid balance of any stipulated penalties, which interest shall begin to accrue at the end of the thirty (30) day period unless a contested case has been requested.

(3) In assessing a penalty under this subsection, the Director may consider the factors set forth in OAR 340-12-045, provided that such factors may not be used to increase a penalty beyond the amounts stipulated in this subsection. Respondents may request a contested case hearing regarding the penalty assessment in accordance with OAR chapter 340 division 11. The scope of any such hearing shall be subject to the stipulations set forth in Section 2 of this Consent Order and shall not review

the amount of penalty assessed per violation per day. Further penalties regarding the alleged violation subject to the penalty assessment shall not accrue from the date DEQ receives a request for a contested case, through disposition of that case.

M. Enforcement of Consent Order and Reservation of Rights

(1) In lieu of stipulated penalties under Subsection 7.L. of this Consent Order, DEQ may assess civil penalties under ORS 465.900 for Respondents' failure to comply with this Consent Order. In addition to penalties, DEQ may seek any other available remedy for failure by Respondents to comply with any requirement of this Consent Order.

(2) Assessment of a stipulated penalty or civil penalty for failure to allow DEQ access as required under Subsection 7.A. or for failure to provide records as required under Subsection 7.E. may be assessed only against the individual Respondent(s) responsible for the violation.

(3) Subject to Section 2 of this Consent Order, Respondents do not admit any liability, violation of law, or factual or legal findings, conclusions, or determinations made by DEQ under this Consent Order.

(4) Nothing in this Consent Order is intended to create any cause of action in favor of any person who is not a signatory to this Consent Order.

(5) Subject to Section 2 of this Consent Order, nothing in this Consent Order shall prevent Respondents from bringing any cause of action, asserting any defenses, or

exercising any rights of contribution or indemnification Respondents might have against any person, including each other, regarding activities under this Consent Order.

(6) Neither this Consent Order nor any judgment enforcing this Consent Order shall be admissible in any judicial or administrative proceeding, except in proceedings by DEQ to enforce this Consent Order, in resolution of disputes under this Consent Order, in response to a citizen suit, or when offered by any Respondent for admission in any proceeding.

N. Indemnification

(1) Respondents shall indemnify and hold harmless the State of Oregon and its commissions, agencies, officers, employees, contractors, and agents from and against any and all claims arising from acts or omissions related to this Consent Order of Respondents and their respective officers, employees, contractors, agents, receivers, trustees, or assigns. DEQ shall not be considered a party to any contract made by Respondents or their respective agents in carrying out activities under this Consent Order.

(2) To the extent permitted by Article XI, Section 7, of the Oregon Constitution and by the Oregon Tort Claims Act, the State of Oregon shall save and hold harmless Respondents and their respective officers, employees, contractors, and agents, and indemnify the foregoing, from and against any and all claims arising from acts or omissions related to this Consent Order of the State of Oregon or its commissions, agencies, officers,

employees, contractors, agents, receivers, trustees, or assigns (excepting acts or omissions constituting DEQ approval of Respondents' activities under this Consent Order). Respondents shall not be considered a party to any contract made by DEQ or its agents in carrying out activities under this Consent Order.

O. Parties Bound

(1) This Consent Order shall be binding on the parties and their respective successors, agents, and assigns. The undersigned representative of each party certifies that he or she is fully authorized to execute and bind such party to this Consent Order. No change in ownership or corporate or partnership status shall in any way alter Respondents' obligations under this Consent Order, unless otherwise approved in writing by DEQ.

(2) Respondents are jointly and severally responsible for carrying out all activities required by this Consent Order other than those where the State has agreed to seek penalties from only the individual Respondent(s) responsible for the violation. Compliance or noncompliance by one or more Respondent(s) with any provision of this Consent Order shall not excuse or justify noncompliance by any other Respondent(s).

P. Modification

DEQ and Respondents may modify this Consent Order by mutual written agreement signed by all parties.

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8. Termination

This Consent Order shall be terminated upon satisfactory completion of work required under this Consent Order and payment by Respondents of any and all outstanding oversight costs and penalties incurred through such completion. DEQ shall determine whether work under this Consent Order is satisfactorily completed by letter issued within sixty (60) days of receipt of the last deliverable required from Respondents under this Consent Order, or as soon thereafter as reasonably practicable.

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9. Signatures

STIPULATED, AGREED, AND APPROVED FOR ISSUANCE:

Respondent

Chevron U.S.A. Products Company

Jeffrey W Hartwig  
(Signature)

JEFFREY W. HARTWIG  
(Name)

MGR. Site Assessment & Remediation  
(Title)

March 8, 1994  
Date

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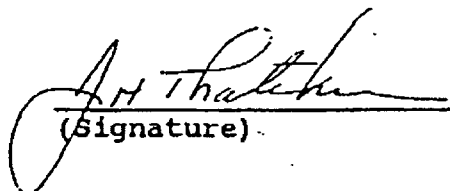
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MAR 10 1994

Waste Management & Cleanup Division  
Department of Environmental Quality

STIPULATED, AGREED, AND APPROVED FOR ISSUANCE:

Respondent

Shell Oil Company

  
(Signature)

J. H. Thatcher

(Name)

Manager, Western Distribution Region

(Title)

March 10, 1994

Date

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MAR 21 1994

Waste Management & Cleanup Division  
Department of Environmental Quality

STIPULATED, AGREED, AND APPROVED FOR ISSUANCE:

Respondent

Union Oil Company of California  
dba Unocal

*J.M. Peck*  
(Signature)

J.M. PECK  
(Name)

OK as to form  
WTS 3-16-94

*General Manager*  
(Title) *Operating Division*

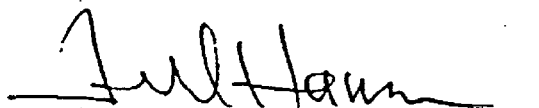
*March 16, 1994*  
Date

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Waste Management & Cleanup Division  
Department of Environmental Quality

STIPULATED, AGREED, AND SO ORDERED:

State of Oregon,  
Department of Environmental Quality

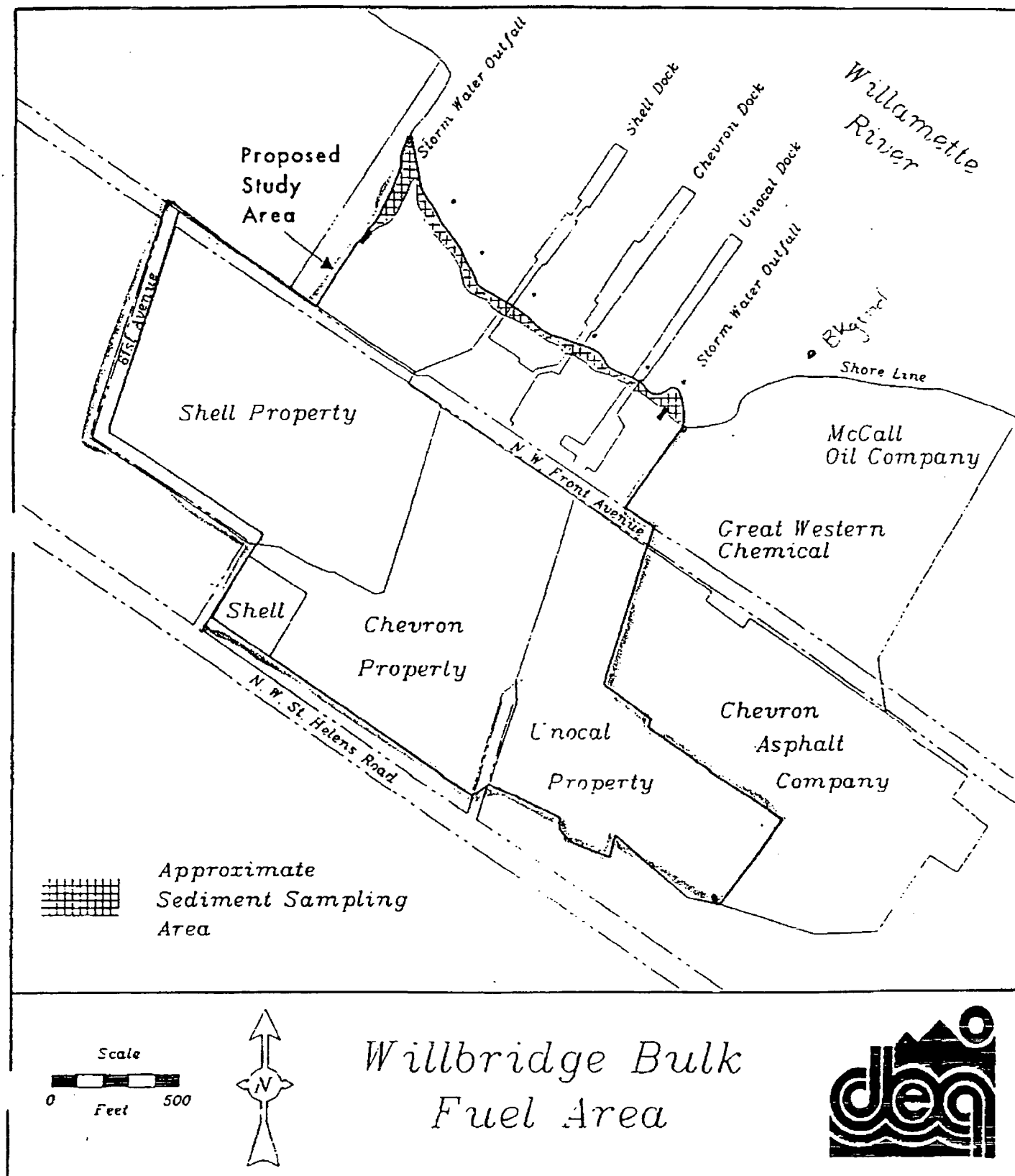
A handwritten signature in dark ink, appearing to read "Fred Hansen", is written over a horizontal line.

Fred Hansen, Director

MAR 30 1994

Date

# Attachment A



## ATTACHMENT B

### REMEDIAL INVESTIGATION/FEASIBILITY STUDY SCOPE OF WORK

#### I. SCHEDULE

Within sixty (60) days of signing the Consent Order Respondents shall designate one Project Manager/Consultant to perform the tasks described in the Scope of Work. Within forty-five (45) days of the selection of the Consultant, Respondents shall submit for Oregon Department of Environmental Quality (DEQ) review and approval, an Interim Action Plan which includes an evaluation of the existing remedial efforts and a proposal for supplementing or enhancing the existing remedial efforts at each facility.

Respondents shall commence implementation of the Interim Actions within fifteen (15) days of receipt of DEQ's approval.

Within ninety (90) days of commencing implementation of the Interim Actions, Respondents shall submit a work plan for a Remedial Investigation and Feasibility Study (RI/FS) which addresses soil, groundwater, surface water, and air.

Within thirty (30) days of receipt of DEQ's written comments, Respondents shall submit a revised work plan or amendments to the work plan addressing DEQ's comments.

Respondents shall commence implementation of the work plan within thirty (30) days of receipt of DEQ's approval.

Respondents shall complete work according to the schedule specified in the approved Interim Action Plan and RI/EA/FS work plans.

It is DEQ's intention to meet the schedule milestones and deadlines in this Consent Order and the approved Work Plan. Any DEQ delay in meeting the deadlines shall correspondingly extend the time for completion by the Respondents. DEQ shall provide fifteen (15) days notice prior to submitting comments and/or approval to the Respondents during all phases of work to enable coordination between the multiple parties.

## II. OBJECTIVES

The objectives of the Interim Action, Remedial Investigation, Endangerment Assessment and Feasibility Study are to:

- A. Identify the hazardous substances which have been released to the environment,
- B. Evaluate the need to install or enhance the existing free product/groundwater contaminant recovery system,
- C. Determine the full nature and extent of hazardous substances in affected media on and off-site,
- D. Determine the distribution of hazardous substance concentrations,
- E. Determine the direction and rate of migration of hazardous substances,
- F. Identify migration pathways,
- G. Identify the environmental impact and risk to human health and/or the environment, and
- H. Develop the information necessary to select a remedial action.

## III. INTERIM ACTION PLAN

An Interim Action Plan shall be developed to address, at a minimum, the following:

- 1. A summation of data, with applicable QA/QC details, derived from previous site assessments and investigations at each facility,
- 2. An evaluation of the existing remedial efforts at each facility, if any,
- 3. A proposal for supplementing or enhancing the existing free product recovery efforts and/or controlling contaminant migration, if applicable,
- 4. Rationale for the proposed interim action,
- 5. A brief description of management precautions (spill prevention/contingency programs) to prevent future releases, and
- 6. A schedule for implementation of the Interim Action.

DEQ encourages the use of interim actions or removals to reduce risks, prevent further contaminant migration, and expedite cleanup at the site. The current status and effectiveness of the existing and proposed interim actions at the site relevant to determining future investigation and cleanup activities.

#### IV. REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN

EPA/  
340/  
3-89/  
304  
The work plan shall be developed in accordance with OAR 340-122-080 and follow the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", OSWER Directive 9355.3-01, 1988, as appropriate. The submitted work plan shall include, but not be limited to, the following items:

##### A. PROJECT MANAGEMENT PLAN

The work plan shall indicate the following:

1. A proposed schedule for submittals and implementation of all proposed activities.
2. A description of the personnel (including subcontractors) involved in the project, including their qualifications to do the proposed work.
3. Discussion of how variations from the approved work plan will be managed.

##### (B) SITE DESCRIPTION

A description of facility operations shall include, but not be limited to, the following:

1. A list of chemical products used on-site currently and historically.
2. The estimated volume of waste disposed of on-site and/or discharged off-site.
3. Time and volume of known spills.
4. A description of past and present waste treatment/disposal practices and areas.
5. The location of past and present raw material and finished product storage areas.



6. The approximate time periods for past operational, treatment, storage, disposal, and/or discharge practices.
7. Any available aerial photos that may provide information regarding disposal practices at the site.

## C. SITE CHARACTERIZATION PLAN

### 1. SOILS

**Objective:** To identify releases of hazardous substances to soils and to assess the nature and extent of soil contamination.

**Scope:** The plan shall address all areas which could potentially have received spills, been used for waste treatment or disposal, or have been affected by contaminated surface water or storm water runoff, and all other areas where soil contamination is known or suspected. Data from previous soil investigations can be used to formulate the approach, provided the data can be shown to have been obtained under appropriate QA/QC protocols or be reliable for the purpose used.

**Procedures:** The program shall be designed and conducted to determine the full vertical and lateral extent of soil contamination. At a minimum, the plan shall include, but not be limited to, the following:

- a. The proposed location of soil borings including:
  - i. depth of borings
  - ii. sampling parameters
  - iii. sampling interval
  - iv. sampling methods

All of the above parameters must include justification for their selection.

- b. Provisions for describing soil boring samples, to include:
  - i. The soil type according to the current version of ASTM D 2487, Classification of Soils for Engineering Purposes, and the current version of ASTM D 2488, Description and Identification of Soils (Visual-Manual Procedures), including; soil color, structure, texture, mineral composition, moisture, and percent recovery.
  - ii. Other relevant characteristics such as visual identification of contamination, odor, and sniffing

using HNU, OVA or other equivalent type equipment as described by a qualified geologist or geotechnical engineer shall be noted.

## 2. GROUNDWATER

**Objective:** To assess the nature and extent of groundwater contamination.

**Scope:** The plan shall supplement previous investigations at the facility and shall identify releases of hazardous substances to groundwater, and shall also characterize the full vertical and lateral extent of groundwater contamination, both on and off-site. Data from previous groundwater investigations can be used to formulate the approach, provided the data can be shown to have been obtained under appropriate QA/QC protocols or be reliable for the purpose used.

**Procedures:** Monitoring wells must be installed in accordance with OAR Chapter 690, Division 240 and DEQ "Groundwater Monitoring Well, Drilling, Construction, and Decommissioning" guidelines (DEQ, 1992). The plan shall include, but not be limited to the following:

- a. Well installation plan, to include:
  - i. Proposed well locations.
  - ii. Proposed well depths.
  - iii. Length of proposed screened intervals.
  - iv. Proposed drilling methods.
  - v. Proposed construction materials and installation methods.
  - vi. Proposed well development and completion methods.
  - vii. The plan should address the possibility that dense nonaqueous phase liquids (DNAPLs) may be present at the facility, describe what precautions will be taken to prevent mobilizing DNAPLs if present, and what methods will be used to determine if they are present.
- b. Groundwater quality monitoring plan to include:
  - i. Proposed well location.
  - ii. Sampling methods.
  - iii. A schedule and proposal for periodic sampling of monitoring wells.
  - iv. Sampling parameters.

- c. Hydrologic characterization proposal to include:
- i. Provisions to collect and describe formation materials during drilling. Respondent may consider obtaining continuous cores and using borehole geophysics to supplement coring.
  - ii. A plan to characterize the hydrogeology including a description of:
    - a. stratigraphy
    - b. structural geology
    - c. depositional history
    - d. regional groundwater flow patterns
  - iii. A description of the hydrogeologic properties of all hydrogeologic units found at the site, including:
    - a. hydraulic conductivity
    - b. porosity
    - c. lithology
    - d. hydraulic interconnections between saturated zones
  - iv. Plans to identify for each aquifer, the following:
    - a. A description of ground-water flow direction.
    - b. Identification of vertical and horizontal gradient(s).
    - c. Interpretation of the flow system including the rate (horizontal and vertical) of ground-water flow, and including seasonal variations.
  - v. A description of hydraulic influences, including:
    - a. Identification of pumping groundwater wells, past and present.
    - b. Influences of rivers, streams, and ditches.
    - c. Influences of ponds and lakes.
    - d. Identification of areas of recharge/discharge.
- d. Well inventory to identify all active and inactive water wells within a one-half mile radius of the facility, to include:
- i. Identification of all wells listed with the Oregon Water Resources Department and field confirmation of their location,
  - ii. A field survey to identify wells for which no logs are on file, one-half mile downgradient if off-site contamination is present.
  - iii. For all located wells, to the extent practicable, identify:
    - a. Owner
    - b. Address

- c. Map location
- d. Driller
- e. Date drilled
- f. Depth
- g. Casing and screen material, depths and intervals
- h. Seal types, depths and intervals
- i. Static pumping levels
- j. Approximate land surface elevation
- k. Reported water quality and use of well
- iv. A plan to sample those private wells identified above which, based on the available information, may be at greatest risk of contamination.
- v. A schedule and proposal for periodic sampling of off-site wells.

### 3. SURFACE WATER

**Objective:** The work plan shall include a plan to identify and evaluate releases of hazardous substances to surface water, including their sediments, originating from the seeps and outfalls located near the Doane Avenue/Front Avenue intersection, and Saltzman Creek (shown on Attachment A).

**Scope:** The plan shall identify all past, existing, or potential impacts to surface waters from the identified release. Data from previous surface water investigations can be used to formulate the approach, provided the data can be shown to have been obtained under appropriate QA/QC protocols or be reliable for the purpose used.

**Procedures:** At a minimum, the plan shall:

- a. Delineate past and present surface drainage patterns at the site.
- b. Delineate past and present discharge of groundwater to surface water, including the sediments potentially impacted by discharges into the Willamette River.
- c. Propose sampling points in past and current surface drainages.
- d. Propose sampling parameters and methodology.
- e. Propose a method for determining background values for all parameters.

- f. Provide a rationale for the proposals.

#### 4. AIR

**Objective:** To identify and characterize the release of hazardous substances, if any, to the air which may contribute to the contamination of other media and are currently unregulated.

**Scope:** The air assessment plan shall be designed to determine if unregulated air emissions from the site threaten human health or the environment. If there are no unregulated air emissions from the site, identify all permits for regulated sources, and briefly describe the regulated sources.

**Procedures:** The plan will include the proposed methodology for evaluating air emissions. Appropriate emission calculations or field sampling program will be presented.

#### D. SAMPLING AND ANALYSIS PLAN (SAP)

**Objective:** To adequately document all sampling and analysis procedures.

**Scope:** In preparation of the SAP, the following guidance documents shall be utilized: The Environmental Cleanup Division Policy #760.000, Quality Assurance Policy; Data Quality Objectives for Remedial Response Activities, EPA/540/G-87/004 (OSWER Directive 9355.0-7B), March, 1987; Test Methods for Evaluating Solid Waste, SW-846; and A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001 (OSWER Directive 9355.0-14), December, 1987.

**Procedures:** The work plan shall include a sampling and analysis plan (SAP) for all sampling activities. The SAP shall be sufficiently detailed to function as a manual for field staff. The SAP shall include, at a minimum:

1. Proposed sampling parameters and rationale.
2. Sampling location and frequency.
3. Description of sample collection techniques, sampling equipment, decontamination procedures, sample handling procedures, and management of investigation derived waste.
4. Quality assurance and quality control procedures for both field and lab procedures, including a data quality objectives plan (as outlined in Table 2-4 (page 2-17) in the CERCLA RI/FS guidance).

following:

1. A Conceptual Site Model for the site. This model should be an iterative flow chart based on available site information showing contaminant sources, release mechanisms, transport routes and media, receptors, and other important information as appropriate. Iterations of this model shall be carried through the work plan and the human health evaluation report as additional information is generated. Exhibit 4-1 of the RAGS-HHEM gives an example of a conceptual site model.
2. Exposure parameters for the reasonable maximum exposure based on both current and future land use scenarios.
3. How detection limits will be established.

#### G. ENVIRONMENTAL EVALUATION PLAN

Objective: The environmental evaluation provides an assessment of the potential threat to ecological populations, communities or ecosystems, in the absence of any remedial action. It provides a basis for determining whether or not remedial action is necessary and the justification for that remedial action.

Scope: The environmental evaluation and the human health evaluation are parallel activities in the evaluation of hazardous substance sites. Much of the data and analyses relating to the nature, fate, and transport of a site's contaminants as well as the site itself will be used for both evaluations. It is important to recognize that each of the two evaluations can at times make use of the other's information. Already available data (from the human health evaluation or previous investigations) should be utilized whenever appropriate and additional data should be generated whenever necessary in order to conduct the ecological assessment. Generally, the work plan should use the outline given below for the Environmental Evaluation Report as a framework for discussing the methodologies and assumptions to be used in assessing the environmental risks at a site.

Procedure: The Risk Assessment Guidance for Superfund - Environmental Evaluation Manual (United States Environmental Protection Agency, Interim Final, March 1989) provides detailed guidance on conducting environmental evaluations. The work plan for the Environmental Evaluation should discuss the different tasks involved in assessing whether or not the potential ecological effects of the contaminants at a site warrant remedial action.

## **H. FEASIBILITY STUDY PLAN**

**Objective:** To develop and evaluate remedial alternatives for each contaminated medium, and recommend remedial actions to be taken at the facility.

**Scope:** The Feasibility Study shall be developed in accordance with OAR 340-122-080 and "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", OSWER Directive 9355.3-01, 1988. The Feasibility Study shall develop an appropriate range of alternatives which meet the standards listed in OAR 340-122-040, and 340-122-090. The Feasibility Study shall be developed in parallel with Remedial Investigation activities.

**Procedures:** A work plan shall be submitted which will include, but not be limited to the following:

### **1. DEFINITION**

- a. Define preliminary remedial action objectives (RAOs). Present a discussion of how final RAOs will be developed and refined; how contaminants and media of concern will be identified; and how preliminary remedial action goals will be set.
- b. Describe the interim remediation activities which have been implemented to date, and the relationship of the interim measures to the preliminary RAOs.
- c. Identify how areas or volumes of media which require response actions will be determined. Describe selection criteria for response areas.

### **2. DEVELOPMENT OF PRELIMINARY ALTERNATIVES**

- a. Describe how general response actions, technology types, and technology process options will be evaluated for each media.
- b. Preliminary alternatives should be assembled to address areas and media which require response action using the technologies identified above.
- c. Describe how preliminary alternatives will be screened.
- d. Identify how the preliminary alternatives that will be carried through the detailed analyses will be selected.

### **3. DETAILED DEVELOPMENT AND SCREENING OF ALTERNATIVES**

- a. Describe how alternatives will be developed.
- b. Describe screening criteria that will be applied.
- c. Review and describe compliance with other applicable laws.

### **1. MAPS**

The work plan shall include a map or maps of the facility which clearly shows:

1. Site topography and surface drainage.
2. On-site structures, including tanks, sumps, catch basins, and pipelines.
3. The location of past spills, disposal areas, and all other waste and product management areas.
4. All pertinent structures adjacent to or nearby the site such as drainage ditches, pipelines, roadways, wells and utility corridors.
5. The location of all existing and proposed soil borings and monitoring wells, surface drainage sampling points, and background sampling points.
6. The drawing date, orientation, and scale.

## **V. REPORTS**

### **A. QUARTERLY REPORTS**

Quarterly reports shall be submitted to DEQ by the 15th day of the month following the reporting period. The first report shall be due on the 15th day of the third month following issuance of this Consent Order, subsequent reports to be submitted every three (3) months thereafter. These reports shall include, but not limited to, the following:

1. Activities that occurred during the past quarter.
2. Data results collected or received during the past quarter.



3. Description of any problems or difficulties experienced during the past quarter.
4. Description of activities planned for the upcoming quarter.

## **B. REMEDIAL INVESTIGATION REPORT**

The Remedial Investigation report shall follow the outline in Table 3-13 (page 3-30 - 3-31) in the CERCLA RI/FS guidance, as applicable, and address the items listed below:

### **1. EXECUTIVE SUMMARY**

### **2. INTRODUCTION**

- a. Purpose
- b. Report Organization

### **3. SITE BACKGROUND** A description and supporting maps of facility operations including, but not be limited, to the following:

- a. Site Description
  - i. Location
  - ii. Physical features such as buildings, roads, etc.
  - iii. Site history
- b. Facility Operations
  - i. Location, time, and volume of known hazardous substance spills including a map.
  - ii. Past and present waste treatment/disposal practices and areas.
  - iii. The approximate time periods for past operational, treatment, storage, disposal, and/or discharge practices.
  - iv. A map of all pertinent structures adjacent to or nearby the site such as drainage ditches, pipelines, roadways, wells and utility corridors.
- c. Site Setting
  - i. Regional land use and history
  - ii. Geology
  - iii. Hydrogeology
  - iv. Surface water
  - v. Climatology

- d. Previous Investigations
  - i. Summary of previous investigations
  - ii. List of reports referenced.

#### 4. STUDY AREA INVESTIGATION

- a. SOILS. The report shall include, but not be limited to, the following:
  - i. A map and description of the location of soil borings or surface samples including depth of borings, sampling parameters, sampling interval, sampling methods, and analytical methods.
  - ii. Description of soil samples.
  - iii. Hydrogeologic cross-sections.
  - iv. A map showing the locations of hydrogeologic cross-sections.
  - v. Presentation of results and data analysis including data limitations.
- b. GROUNDWATER. The report shall include, but not be limited to, the following:
  - i. Describe the well installation plan including well locations, well depths, length of screened intervals, drilling methods, construction materials and installation methods, well development and completion methods.
  - ii. Characterize the hydrogeology including a description of formation materials, the hydrogeology, and hydrogeologic properties of each pertinent aquifer.
  - iii. Present water table/potentiometric maps.
  - iv. Describe hydraulic influences from groundwater wells, and surface water bodies.
  - v. Identify areas of recharge/discharge.
  - vi. Present results of the well inventory to identify all active and inactive water wells within a one-half mile radius of the facility.
  - vii. Present results and data analysis including data limitations.
- c. SURFACE WATER. The report shall include, as applicable:
  - i. Identify, and show on a map, all relevant surface water bodies.
  - ii. Delineate past and present surface drainage patterns

at the site and include a map showing the stormwater collection system.

- iii. Present results and data analysis including data limitations.

- d. AIR. The report shall include as applicable:

- i. Provide a map and description of air sampling locations.
- ii. Describe parameters for analysis, and analysis method.
- iii. Present results and data analysis including data limitations.

## 5. SUMMARY AND CONCLUSIONS

- a. Nature and extent of contamination. Include a discussion of data limitations.
- b. Fate and transport of contaminants.

## 6. APPENDICES

Supporting information of the Remedial Investigation shall be submitted in the Appendices of the report. The report shall include, at a minimum:

- a. All boring and lithologic logs for soil borings and monitoring wells.
- b. Well construction details, including:
  - i. surveyed location (latitude or longitude)
  - ii. elevation of top of casing
  - iii. size and depth of well
  - iv. screened interval
  - v. well construction diagrams
- c. A description of all sampling and investigation procedures.
- d. Results of all chemical and physical analyses.
- e. Quality assurance and quality control data and a data validation report.

As part of the Remedial Investigation and report to DEQ, Respondent may incorporate existing data, reports or information, including data from any investigation activity conducted prior to the effective date of this Order, to the extent that such data is consistent with the procedures and quality assurance/quality control criteria approved by DEQ.

### **C. HUMAN HEALTH EVALUATION REPORT**

The results of the human health evaluation should follow the outline suggested by the RAGS-HHEM (see Exhibit 9-1 of the RAGS-HHEM). Justification for not following the outline should be explained.

#### **1. Introduction**

Provide a detailed description of the site, its problems, its geographic location, and its history. It should also provide the specific objectives, scope, and organization of the risk assessment report.

#### **2. Chemicals of Concern**

Provide a detailed description of how data was gathered or generated in order to identify a set of chemicals that are likely to be site-related. The concentrations of these chemicals that are of acceptable quality for use in the quantitative analysis of the risk should be reported.

#### **3. Exposure Assessment**

Provide a detailed description of the exposure pathways (source, release mechanisms, transfer or transport mechanisms, potentially exposed population, exposure routes). The quantitative estimate of exposure based on both current and future land use scenarios should be included.

#### **4. Toxicity Assessment**

Provide a summary of current toxicity information on the carcinogenic and non-carcinogenic effects of different chemicals of concern, and provide up-to-date reference levels (reference doses and slope factors) for chemicals of concern.

#### **5. Risk Characterization**

Present the quantitative risks potentially associated with the site as well as an assessment of uncertainty and consideration of any site-specific human health studies, if available and appropriate. If portions of these sections have been prepared for other sections of a Remedial

Investigation (RI) report, these may be referenced.

**NOTE:** Actions at hazardous substance sites that the Waste Management and Cleanup Division is involved with should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land use conditions. Guidance on quantifying the RME is given in Chapter 6 of the RAGS-HHEM. Quantifying the risks from the RME should be the overall goal of the baseline risk assessment.

It is strongly suggested and encouraged that the following items be discussed with, and agreed upon by, DEQ staff prior to the completion of the human health evaluation, after the sampling and chemical analysis are completed:

- a. List of all site contaminants identified.
- b. Detection limits used for the contaminants and explanation of how non-detect values will be used.
- c. Rationale for selecting chemicals of concern for the human health evaluation.
- d. Summary table of contaminants, reference values (reference doses, slope factors, and other relevant toxicity endpoints) and citations; data on absorption values should be included.
- e. Exposure points and exposure point concentrations to be used in the human health evaluation.
- f. Explanation of how uncertainty analysis will be done.

#### **D. ENVIRONMENTAL EVALUATION REPORT**

The main sections of the environmental evaluation report should include the following:

##### **1. Summary of Data**

Describe all the available data which are important in determining the environmental risk. Reference other sections of the RI or the human health evaluation report where detailed data are provided.

##### **2. Contaminant Identification and Screening**

Describe the process of generating contaminants of ecological concern in the environmental evaluation process.

### 3. Exposure Assessment

Quantify the release, migration, and fate of contaminants of concern. Characterize potentially exposed ecological populations, communities, or ecosystems and measure or estimate exposure point concentrations.

### 4. Toxicity Assessment

Provide a summary of current information on the potential ecological effects of contaminants of concern, include analyses of available toxicological studies, toxicological assessments, and available toxicological reference values or the generation of such values.

### 5. Risk Characterization - Ecological Endpoints

Provide a description of ecological endpoints as measurements of impact or probability of impact. Characterize these impacts in terms of their potential ecological significance.

Also, include an assessment and presentation of uncertainties in the process of ecological assessment.

## E. FEASIBILITY STUDY REPORT

The results of the Feasibility Study shall be submitted to DEQ in a report which, at a minimum, includes a full evaluation of remedial action alternatives, giving a workable number of options which each appear to adequately address site problems and remedial action objectives. These alternatives shall include a no action option, at least one option which will achieve background, and at least one option which will achieve protection of public health, safety, and welfare, and the environment.

The FS shall follow the outline in Table 6-5 (Pages 6-15) of the CERCLA guidance, as applicable. The report shall present the following for each alternative:

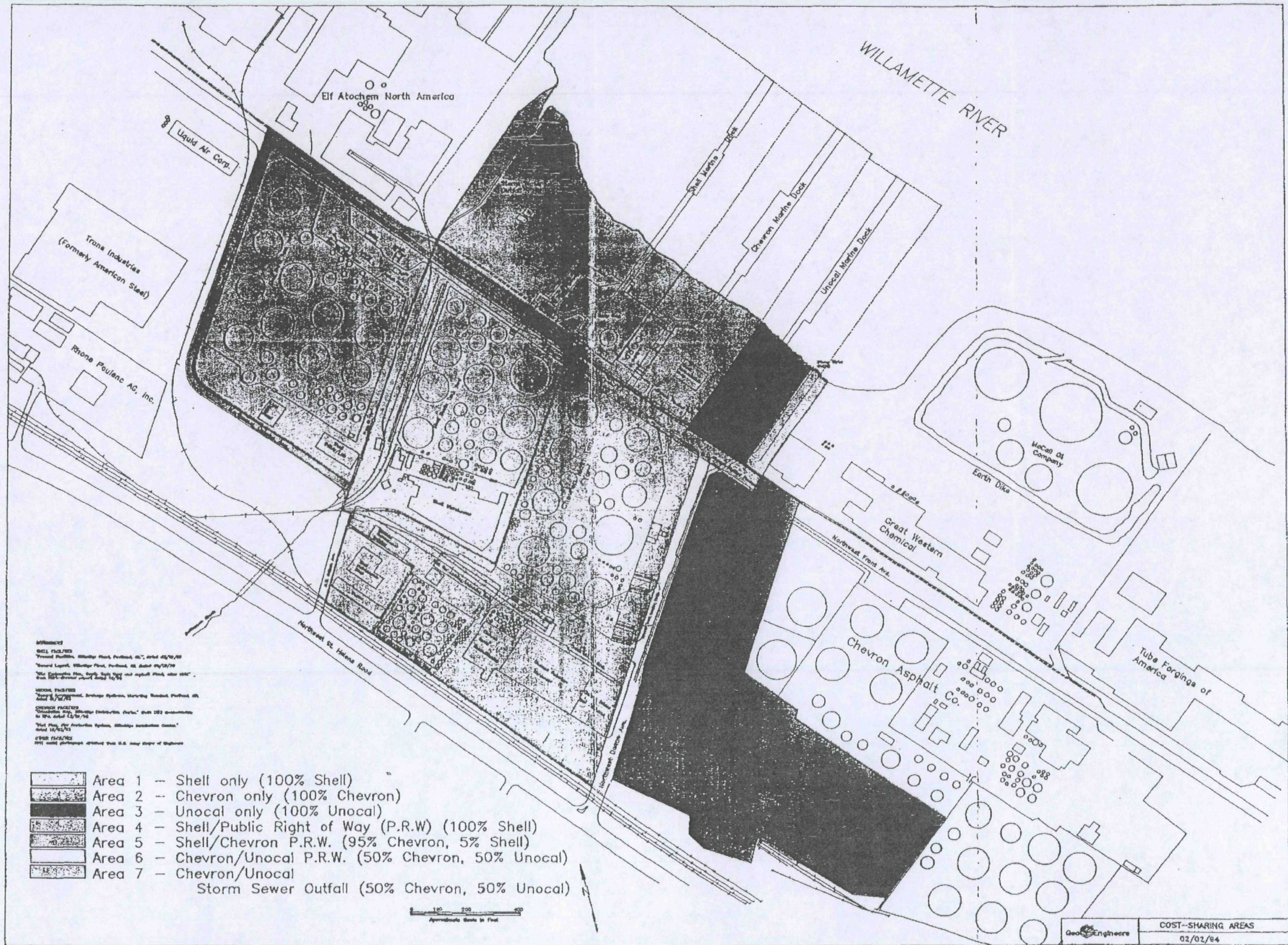
1. Description and comparison of the remedial action alternatives, estimated cost, and rationale for selection.
2. Performance expectation (i.e., reductions in contaminant concentration levels), reliability, and ability to implement.

3. Identify any permits, rules, or other requirements necessary for implementation of remedial activities and applicable to the site.
4. Design criteria and rationale.
5. General operation and maintenance requirements; necessary engineering or institutional controls.
6. Monitoring program to assure both short-term and long-term performance of the alternative.
7. Financial assurance mechanism to assure performance.
8. Estimated time for implementation.
9. Evaluation of the short-term and long-term effectiveness and risks of the alternative.
10. Recommendation and justification of the remedial action selected from the developed alternatives.
11. A schedule for implementation of the proposed remedial action.
12. Evaluation of necessity or appropriateness of exemptions under ORS 465.315(2).
13. A schedule for implementation of the proposed remedial action.

**F. REPORT DISTRIBUTION**

1. Three bound and 1 unbound copy of all reports should be submitted to DEQ.
2. DEQ requests that all copies be duplex printed on recycled paper.









ENVIRONMENTAL MANAGEMENT, INC.

FILE COPY

August 15, 2002  
Project No. B17-01G

Ms. Jill Kiernan  
Department of Environmental Quality - Northwest Region  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201

**Re: Comment Response Document  
Remedial Investigation Report  
Willbridge Terminals Group  
Portland, Oregon**

Dear Ms. Kiernan:

On behalf of the Willbridge Terminals Responsible Parties Group (RP Group), KHM Environmental Management, Inc. (KHM) has prepared this letter to present responses to the March 8, 2002 letter from the Oregon Department of Environmental Quality (DEQ). The DEQ letter presented several comments to the Draft Remedial Investigation (RI) Report dated December 2000. The purpose of this letter is to describe how each of the DEQ comments will be addressed in the preparation of the Final RI report.

## COMMENT RESPONSES

The following section provides a discussion of each of the 135 DEQ comments to the Draft RI report. KHM and Hart Cowser, the consultant retained for the outstanding risk assessment work, have developed the following responses. Each response is referenced to the comment number presented in the DEQ letter. The number for each individual response corresponds with the number for each of the DEQ comments.

### Responses to Comments

1. KHM is currently checking all tables and figures for accuracy against the laboratory analytical reports. The figures and tables will be revised as necessary. The method reporting limits (MRLs) have been added to the tables for the parameters reported as "non-detect". Corrected tables and figures will be provided in the Final RI report.

2. An improved description of the contaminate fate and transport will be presented in the Final RI report. Data acquired after the submittal of the Draft RI report will aid in determining whether or not a vertical gradient exists between the alluvium and the underlying basalt unit. In addition, using the existing monitoring results, KHM will prepare an evaluation of whether or not the pumping of the Chevron Asphalt Well has an affect on the migration of dissolved petroleum hydrocarbons as part of the Final RI report.
3. Since development of the Consent Order for the Willbridge Terminals and implementation of the RI, the Portland Harbor has been listed as a CERCLA cleanup site. The current management approach for the Portland Harbor provides for United States Environmental Protection Agency (EPA) oversight of all in-water assessment and remediation. Accordingly, the RP Group is proposing that the human health risk assessment (HHRA) and ecological risk assessments (ERA) will be limited to upland exposure scenarios and receptors. This is consistent with the manner in which multiple other RIs are being conducted within the Portland Harbor. All comments relating to in-water issues identified by DEQ will no longer be included in this current Human Health and Ecological Risk Assessment but will be evaluated during future CERCLA Activities associated with the Portland Harbor Superfund site. Transport pathways from the upland to the aquatic environment will be acknowledged as being present, no quantification or evaluation of in-water risks will be performed in this risk assessment report. The "Mean (or Ordinary) High Water Mark" will be used to differentiate upland versus in-water portions of the facility for this risk assessment.
4. The figures and tables in the final RI report will include the analytical results of samples collected from the off-site wells.
5. The Final RI report will include the analytical results of the seep samples collected at the Kinder Morgan facility on September 14, 2001.
6. The Final RI report will include revisions to the appropriate figures to show the location of the natural waterways, the 60-inch storm sewer, the former 27-inch storm sewer, Saltzman Creek, and the confluence of Saltzman Creek and the Willamette River. KHM will also prepare new figures to show the available historic topography information for Doane Lake, Kittridge Lake, and Holbrook Slough and the current zoning.
7. Readily available wind data for the area will be provided in the Final RI report.

8. As stated in Response No. 6, a zoning map will be provided in the Final RI report. This map will show the River Industrial Greenway Overlay.
9. Improved figures illustrating the development history of the site will be included in the Final RI report. Additionally, we will include the aerial photographs that were reviewed as part of the Draft RI report.
10. Additional information regarding the current and reasonably likely land uses of the Willamette River and the confluence with Saltzman Creek will be included in the Final RI report. A primary component of the expanded description will be a discussion of the importance of the riparian habitat and corresponding ecological and recreational land uses.
11. Hart Crowser will complete a Revised Level 1 – Scoping Ecological Risk Assessment (ERA) for the upland portion of the facility as part of the Final RI report. Particular attention will be placed on the greenbelt along the Willamette River and also on Saltzman Creek. As discussed in Response No. 3, no in-water exposure pathways or receptors will be discussed or quantified in this risk assessment. All in-water work will be conducted in conjunction with the Portland Harbor CERCLA activities.
12. Hart Crowser will complete a Revised Level 1 – Scoping ERA for the upland portion of the facility and that will include a list of wildlife species likely to be found at the site in Section 2.4.1 of the Final RI report.
13. The Final RI report will revise the animal species list and provide references as requested by DEQ. It should be noted that even with an additional site visit and a review of the existing literature, a complete list of potential wildlife species in and adjacent to the facility may be impossible to generate. However, the common species expected to be present and a thorough evaluation of potential terrestrial threatened and endangered species will be conducted.
14. As discussed in previous Response No. 3, identification of in-water receptors is outside the revised scope of the risk assessment. This work will be accomplished as part of the ongoing Portland Harbor CERCLA activities.
15. A new figure showing the locations of currently designated wetlands (if present) in the Locality of the Facility will be presented as part of the Final RI report. This work will not include assessment of locations of historic wetlands that existed within the locality of the facility. The historic topography map will show the historic Holbrook Slough, Kittridge Lake and Doane Lake (Response No. 6). Information on current wetlands (if present)

will be incorporated into the revised Level 1-Scoping Ecological Risk assessment.

16. The appropriate figures will be revised as part of the Final RI report to show the available items listed in the DEQ comment.
17. The Final RI report will include a paragraph discussing the current stormwater and sanitary sewer permits. We do not believe that the hazardous waste generator status for each facility is relevant to the remedial investigation that has been focused on past releases that may pose a risk to human and ecological receptors.
18. The units on the Spills Summary Tables will be added to the Final RI report.
19. Table 1 will be updated to account for the most recent releases at the Chevron Terminal as part of the Final RI report.
20. The correct Appendix will be referenced in the Final RI report.
21. Table 3 will be updated in the Final RI report to account for the most recent releases at the Tosco Terminal.
22. Section 3.2 will be modified such that metals are described as contaminants of interest. Metals will be included in the screening process and carried forward for risk assessment if necessary.
23. Figures showing the extent of historic separate-phase hydrocarbons (SPH), based on available historical reports, and current SPH will be provided in the Final RI report.
24. Section 4.1 will include a discussion of compounds typically associated with tank bottom sludges.
25. Section 4.2 will be revised to include the information of the more recent releases at the Tosco and Chevron Terminals.
26. Text will be added to Section 4.3.1 identifying structures that may potentially receive vapors at the three terminals.
27. As available, Section 4.3.2 will be modified to present a history of soil excavation activities at the three terminals.
28. The locations of the two industrial supply wells, one is located at the Chevron Asphalt Plant and one is located at the Air Liquide Plant, will be shown on a map in the Final RI report.

29. As discussed in Response No. 2, the Final RI report will include an evaluation of whether the supply well has influenced migration of petroleum hydrocarbons in groundwater.
30. Hart Crowser has prepared a new CSM based on DEQ comments and Hart Crowser's July 18, 2002 site visit. A current and future CSM is included as Attachments A and B to this letter. Response to specific sub-comments are provided below:

**30a: On-Site Workers:** Ingestion of surface soils and inhalation of vapors from subsurface soils and groundwater (indoor workers) will be evaluated in the HHRA. Dermal contact with surface water, sediment, and SPHs will not be evaluated.

**30b: Trench Workers:** Ingestion and dermal contact with surface and subsurface soils will be evaluated.

**30c: Recreational River Users:** These potential receptors will be identified in the CSM, but will not be evaluated in accordance with Response No. 3.

**30d: Trespassers:** Because of the increased security measures put in place post September 11, 2001 at petroleum bulk terminals nationwide, the potential for trespasses to be present on the Willbridge Facility is remote or impossible. The new CSMs (see attachments A and B) do not identify trespassers as having any complete exposure pathways at this facility.

**30e: Off-Site Workers:** Off-Site workers will be identified as potential receptors in the CSM. Inhalation of vapors from subsurface soils and groundwater will be identified as potentially complete exposure pathways for these workers. Inhalation of fugitive dust is likely an insignificant exposure pathway for all exposure scenarios. This pathway will only be quantitatively evaluated for an off-site worker if risks and hazards to on-site workers via the inhalation of fugitive dust pathway are unacceptable. Dermal contact with surface water, sediment, and SPHs will not be evaluated.

**30f: Landscape Workers:** Ingestion and dermal contact with surface and subsurface soils, inhalation of fugitive dust, and inhalation of vapors from subsurface soils and groundwater will be identified as potentially complete exposure pathways. Dermal contact with surface water, sediment, and SPHs will not be evaluated.

Landscaping activities have been completed at the Phillips Petroleum portion of the facility and, therefore, the landscape worker scenario will only be evaluated for the Chevron and Kinder-Morgan properties.

31. Hart Crowser will complete a revised Level 1-Scoping Ecological Risk Assessment for this site as part of the Final RI report. The CSMs have been revised so that there is no longer a category for "Insufficient Data to Confirm or Eliminate Exposure Pathways". The ecological receptor CSM has been revised and will be discussed at the next meeting with DEQ. Hart Crowser disagrees with the statement that there are complete exposure pathways present for exposure of aquatic species to surface soils. Again, while in-water exposure pathways will be identified in the CSMs, no quantification of in-water risks will be conducted as part of this current risk assessment. All in-water work will be completed as part of the Portland Harbor CERCLA activities.
32. As noted on the attached revised CSM, there are no exposure pathways or exposure routes identified as "Undetermined Due to Insufficient Data to Confirm or Eliminate Exposure Pathway."
33. Section 5.3.1.3 will be revised. The purpose of the utility trench investigation will be clearly stated. In addition, Figure 37 will be re-drafted to provide a more legible map.
34. A more complete description of the Holbrook Slough Investigation will be presented in Section 5.3.2 of the Final RI report.
35. The releases used for the surrogate hot spot analysis will be better described in Section 5.5 of the Final RI report.
36. A figure will be added to the Final RI report that will show the locations of the geotechnical borings completed on the Chevron facility for replacement of storage tanks. In addition, this figure will show the locations of geologic cross-sections of the study area. The boring logs will be included as an Appendix to the Final RI report.
37. Section 6.3.2 will be modified to provide a more complete discussion on the hydraulic gradient across the site. However, we do not feel that a map showing the Saltzman Creek watershed in the hills above the facility and the 500-year floodplain in relation to the site is relevant to RI.

38. As stated in Response No. 36, geologic cross-sections will be prepared including cross-sections for the area along the waterfront and the area across the middle of the facilities parallel to the river.
39. Section 6.4.2.2 of the Final RI report will provide a discussion on the hydraulic relationship between the overlying alluvium and the basalt. Based upon recent investigations conducted at the Chevron Terminal for the ethanol release study, there appears to be an upward gradient from the basalt to the alluvium. This information will be formally presented and supported in the final RI report.
40. The RI report will include an explicit description of the upland-surface water pathways that are present at the site. However, any potential impacts to surface water and sediments will be evaluated during the CERCLA work for the Portland Harbor (as presented in Response No. 3). Information on the Interim Remedial Action Measures to address seeps, consisting of work at the 60-inch storm sewer outfall and proposed work at the former 27-inch storm sewer, has been submitted separately.
41. The method reporting limits will be presented in the tables for the non-detect laboratory parameters as part of the Final RI report.
42. The cumulative gauging and analytical data will be provided as an Appendix to the Final RI report.
43. Risk-based screening will be presented in the risk assessment as part of the COPC identification process.
44. Each of the analytical tables will be checked against the original certified analytical report. The text section of the Final RI report presenting a discussion of the analytical results will be modified to agree with the analytical tables.
45. Figure 23 will be corrected in the Final RI report.
46. Section 6.6 of the Final RI report will be correctly revised to address this comment.
47. This comment is addressed as part of the Response No. 43 (above).
48. This comment is addressed as part of the Response No. 43 (above).
49. This comment is addressed as part of the Response No. 43 (above).

50. The reference for the hot spot sample results will be corrected in Section 6.8 in the Final RI report.
51. Figure 25 will be corrected. The volatile organic compounds (VOCs) results for Sample Chev-SS-12 will be listed on this figure.
52. As stated with Response No. 1, the figures and tables are all being checked against the original analytical data and Figure 27 will be corrected accordingly.
53. Figure 28 will be reviewed and revised if necessary.
54. See Response No. 1.
55. See Response No. 1.
56. KHM will assess whether or not VOC analytical results exist for surface soil samples collected on the Kinder Morgan property.
57. See Response No. 1.
58. See Response No. 1.
59. See Response No. 1.
60. See Response No. 1.
61. See Response No. 1.
62. Discussion regarding arsenic detected at the site is at, or below, background levels will be strengthened by reviewing the background levels at other remedial investigation sites in the area.
63. See Response No. 1.
64. A discussion on whether or not the Columbia River Basalt aquifer should be included in the locality of the facility will be provided in Section 7.1 of the Final RI report.
65. Figure 2 of the Final RI report will be corrected as suggested.
66. The argument for the boundaries of the locality of the facility will be strengthened in Section 7.1 of the Final RI report. If available, data from the Chevron Asphalt Plant supply well will be presented in this section.



67. As presented with Response No. 10, the Final RI report will contain a revised Level 1- Scoping Ecological Risk Assessment and this revised Level 1 will provide updated information on Saltzman Creek.
68. Section 8 of the Final RI report will be revised upon revision of the Human Health and Ecological Risk Assessment.
69. As presented with Response No. 3, the RP group proposes that all exposure scenarios associated with exposure to surface water and sediment will be evaluated under the Portland Harbor CERCLA activities. Consequently, these exposure scenarios are no longer within the scope of the human health and ecological risk assessment.
70. The Final RI report will present risk assessment results consistent with OAR 340-122-0115(1) acceptable risk levels.
71. Additional Hot Spot evaluation will be conducted subsequent to completion of the revised Human Health and Ecological Risk Assessment.
72. See Response No. 71.
73. The beneficial uses of water determination will be further refined based upon data collected during the RI field activities and data more recently collected during the completion of an in-house research project at the Chevron Light Products Terminal. As stated with Response No. 66, if analytical data exists for the Chevron Asphalt supply well, this data will be evaluated as part of the Final RI report.
74. As presented with Response No. 35, a discussion of the surrogate hot spot analysis for the two release areas will be provided in Section 9.2.2 of the Final RI report.
75. Section 10.2 will be revised upon completion of the revised Human Health and Ecological Risk Assessment.
76. Section 10.2 will be revised to clarify all exposure pathways evaluated in the revised Human Health Risk Assessment.
77. Section 10.2 will be revised to include a discussion of risks and hazards associated with all receptors and exposure pathways quantitatively evaluated in the HHRA.
78. The Final RI report will include descriptions and figures showing the areas of theoretical unacceptable risk based on the results of the risk assessment.

79. The typographic error will be corrected in Appendix A, Table A-1.
80. All compounds identified as COPCs will be carried through the HHRA in the Final RI report. As per the comment, risks and hazards will be presented for each exposure pathway, multiple pathways for each COPC, and the total risks and hazards for each scenario.
81. Reasonably likely future industrial uses of groundwater will be quantitatively or qualitatively evaluated in the HHRA.
82. Exposure units will be clearly defined in the Final RI report. The three sites (Chevron, Tosco, and Kinder Morgan) within the Willbridge facility will continue to be characterized as separate exposure units. Additionally, two off-site exposure units, immediately to the south and north of the three on-site exposure units, will also be identified in the RI report. Both soil and groundwater will be evaluated based on these five exposure units. Because consumption of groundwater is not a beneficial water use at the Willbridge Facility, groundwater COPC concentrations will be averaged over each exposure unit.
83. COPCs will be identified separately for each exposure unit. COPC screening in the revised HHRA will follow recommended DEQ guidance.
84. As discussed in Response No. 82, groundwater COPC concentrations will be averaged over each exposure unit. Potential risks and hazards associated with COPCs in groundwater will, therefore, be identified for each exposure unit separately. Assessment of the Locality of the Facility will be completed as part of the Final RI report.
85. As discussed with Response No. 62, the discussion regarding possible background contributions to the arsenic detected at the site at or below background levels, will be supported by reviewing the background levels at other remedial investigation sites in the area, and if appropriate, the Washington State Department of Ecology Clark County soil background values for metals will be used.
86. The revised HHRA will qualitatively evaluate the TPH soil and groundwater results as part of the Final RI report.
87. A map showing the locations of the fences will be provided in the Final RI report.
88. As discussed with Response No. 31, both surface and subsurface soil will be considered when evaluating the trench worker scenario.

89. As presented with Response No. 80, all constituents identified as COPCs will be carried through the HHRA. Risk and hazard estimates will be calculated for all COPCs with EPA toxicity values.
90. A map will be provided showing the locations of the items listed in this comment as part of the Final RI report.
91. Chemical-specific parameters used in modeling dermal and inhalation exposures will be provided in the revised HHRA in the Final RI report.
92. Dermal exposure to PAHs will be evaluated using the oral toxicity values similar to the other COPCs. In addition, the uncertainty associated with PAHs and dermal exposure will be discussed in the uncertainty sections.
93. References to regulatory guidance will be included in the revised HHRA.
94. See Response No. 30.
95. All data used in the HHRA and ERA will be included in the RI report and will be appropriately referenced.
96. A table comparing sample quantitation limits (SQLs) or method reporting limits (MRLs) against risk-based screening criteria will be included in the revised HHRA.
97. The Final RI report will identify sample locations where bis(2-ethylhexyl)phthalate was detected in groundwater samples, and provide appropriate discussion on these sample results.
98. COIs with SQLs or MRLs greater than their respective risk-based screening levels will be further evaluated in the HHRA, but not necessarily identified as COPCs. This additional evaluation will include, but will not be limited to, a review of detection frequency, method detection limits versus risk-based screening levels, and location of elevated SQLs or MRLs.
99. Compounds that have no screening values (i.e., no EPA-validated toxicity values) will be evaluated using surrogate toxicity values when available and appropriate. Compounds that do not have toxicity values or surrogate toxicity values will be evaluated qualitatively in the risk characterization section of the HHRA.
100. As presented with Response No. 1, all tables in the RI will be reviewed to ensure that they are accurate and consistent throughout the report. As noted

previously, the data used in the HHRA and ERA will be included and appropriately referenced in the RI report.

101. As presented with Response No. 1 and No. 100, all tables in the RI will be evaluated to ensure that they are accurate and consistent throughout the report.
102. As noted in Response No. 3, the in-water exposure pathways will not be evaluated in this HHRA.
103. See Response No. 30.
104. Inhalation of volatiles from soil and groundwater to indoor and outdoor air will be quantitatively evaluated in the HHRA. The migration of volatiles from soil to indoor and outdoor air for off-site workers will only be evaluated if the off-site soil contamination is the result of on-site activities. As discussed previously, the risk characterization section will evaluate all exposure pathways for each potential receptor when calculating total risks and hazards.
105. See Response No. 30.
106. Data sets used to calculate soil and groundwater EPCs for all receptors will be identified or appropriately referenced in the HHRA.
107. As noted in Response No. 3, in-water exposure pathways will not be evaluated in this HHRA. Volatilization to indoor and outdoor air will include both migration from soil and groundwater.
108. As presented in DEQ's comment, the distribution of all data sets will be evaluated and the 90 percent upper confidence limit on the arithmetic mean (90 percent UCL) will be calculated for each data set based on EPA's "Supplemental Guidance to RAGS: Calculation the Concentration Term."
109. The 90 percent UCLs for each COPC and each data set will be used as the RME concentration for all HHRA risk and hazard calculations, while the arithmetic mean will be used as the CT concentration. Thus, the EPCs will be consistent with Oregon Administrative Rules. Recent groundwater data will be included in the risk assessment data set.
110. Outdoor air EPCs will be included in the outdoor air exposure pathway risk characterization tables.

111. All site-specific parameters used in the volatilization to indoor air model will be included and discussed in the HHRA.
112. The data sets used for depth to groundwater and the methodology for evaluating seasonal variations in groundwater levels will be included and discussed in the HHRA.
113. The migration of volatiles from soil and groundwater to indoor air will be evaluated using the models presented in DEQ's "Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites" (RBDM) guidance document. The buildings on-site are currently being evaluated. Any building parameters other than the default parameters included in the RBDM guidance document will be justified in the HHRA. This justification may include building dimensions, locations, and descriptions.
114. A discussion of the uncertainty associated with the volatilization modeling will be included in the uncertainty section of the HHRA in the Final RI report.
115. Comment noted.
116. Chemical-specific parameters used in modeling dermal and inhalation exposures will be provided in the revised HHRA.
117. The "K" factor that is included in Tables 1-13 and 1-14 (inhalation of vapors exposure equation and parameters) appears to be unnecessary and will not be included in the revised HHRA.
118. Compounds that have no screening values (i.e., no EPA-validated toxicity values) will be evaluated using surrogate toxicity values when available and appropriate. Compounds that do not have toxicity values or surrogate toxicity values will be evaluated qualitatively in the risk characterization section of the HHRA.
119. As recommended, the revised HHRA will evaluate the dermal exposure pathway using oral toxicity values as surrogates for dermal toxicity values. The oral toxicity values will not be adjusted using gastrointestinal absorption factors.
120. The discussion of risks and hazards will be consistent with DEQ's acceptable risk and hazard levels.

121. As presented with Response No. 1 and No. 100, all tables in the RI will be evaluated to ensure that they are accurate and consistent throughout the report.
122. The uncertainty section in the revised HHRA will include a discussion of the uncertainty associated with the data evaluation, exposure assessment, toxicity assessment, and risk characterization sections of the HHRA.
123. Hart Crowser will revise the Level 1 – Scoping Risk Assessment and will pay particular attention to the riparian area adjacent to the Willamette River. The evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during the Portland Harbor CERCLA activities.
124. The Level 1 – Scoping Risk Assessment will be revised as part of the Final RI report and will pay particular attention to Saltzman Creek and its associated habitats.
125. The Level 1 – Scoping Risk Assessment will be revised as part of the Final RI report. See Response No. 123 and No. 124.
126. The Final RI report will include updates to the ecological CSM for this site and will address surface soil exposures for terrestrial wildlife where appropriate. Data from the upland seeps will be included in ecological risk evaluation. With regards to the second portion of this comment, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during the Portland Harbor CERCLA activities.
127. The Final RI report will include revisions to the ecological CSM for this site. However, in-water exposure pathways and scenarios will not be evaluated in this current ecological risk assessment.
128. The Final RI report will include an updated description and evaluation of riparian areas within the LOF, however all in-water exposure pathways and receptors (e.g. below the ordinary high water mark) will be conducted during the Portland Harbor CERCLA activities and are outside the scope of this current ecological risk assessment.
129. As presented with Response No. 3, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of

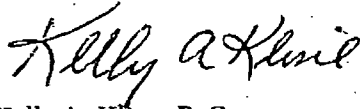
in-water risks will be conducted during the Portland Harbor CERCLA activities.

130. As presented with Response No. 3, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during CERCLA activities.
131. As presented with Response No. 3, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during the Portland Harbor CERCLA activities.
132. As presented with Response No. 1, all tables in the Final RI report will be evaluated to ensure that they are accurate and consistent throughout the report.
133. As presented with Response No. 3, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during the Portland Harbor CERCLA activities.
134. As presented with Response No. 3, the evaluation of ecological risks within the in-water portions of the LOF (below the ordinary high water mark) is outside the scope of the current ecological risk assessment. Quantification of in-water risks will be conducted during the Portland Harbor CERCLA activities.
135. The potential for PAHs to bioaccumulate in organisms varies considerably among different taxa. Vertebrate species have a high capacity to metabolize (e.g. eliminate) PAHs but some invertebrate species have a much lower capacity to metabolize PAHs. This section will be revised, as appropriate, to consider terrestrial exposures to PAHs by wildlife. As previously discussed, all in-water exposure scenarios are outside the scope of this current ERA and will be evaluated during the Portland Harbor CERCLA activities.

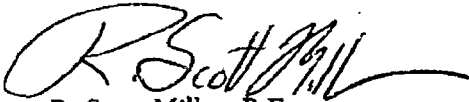
KHM would like to setup a meeting around the week starting September 16, 2002 to discuss the any concerns you have with the responses to your comments. KHM looks forward to working with you in finalizing this Remedial Investigation report. If you need further information or have any questions, please call the undersigned at (503) 639-8098.

August 15, 2002  
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Sincerely,  
**KHM Environmental Management, Inc.**



Kelly A. Kline, R.G.  
Senior Geologist

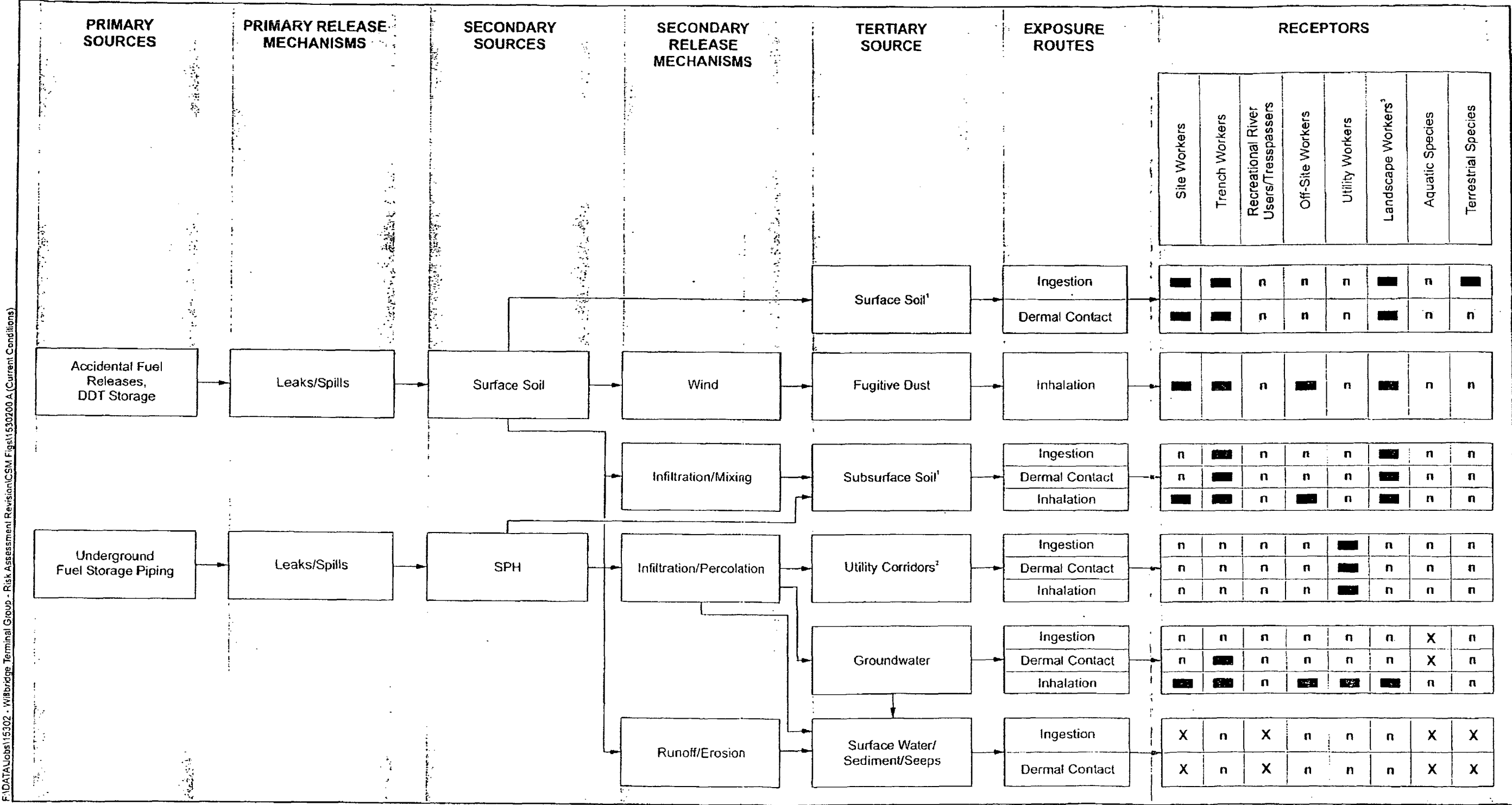


R. Scott Miller, P.E.  
Principal Engineer

cc: Mr. Martin Cramer, Phillips Petroleum Company  
Mr. Eric Conard, Kinder Morgan Energy Partners  
Mr. John Foxwell, c/o Kinder Morgan Energy Partners  
Mr. Frank Fossati, Shell Oil Company  
Mr. Gerald O'Regan, Chevron Products Company  
Mr. Gerry Koschal, PNG Environmental, Inc.  
Dr. Taku Fujii, Hart Crowser, Inc.



Conceptual Site Model - Current Conditions  
Willbridge Facility Risk Assessment  
Willbridge Terminal Group, Portland, Oregon



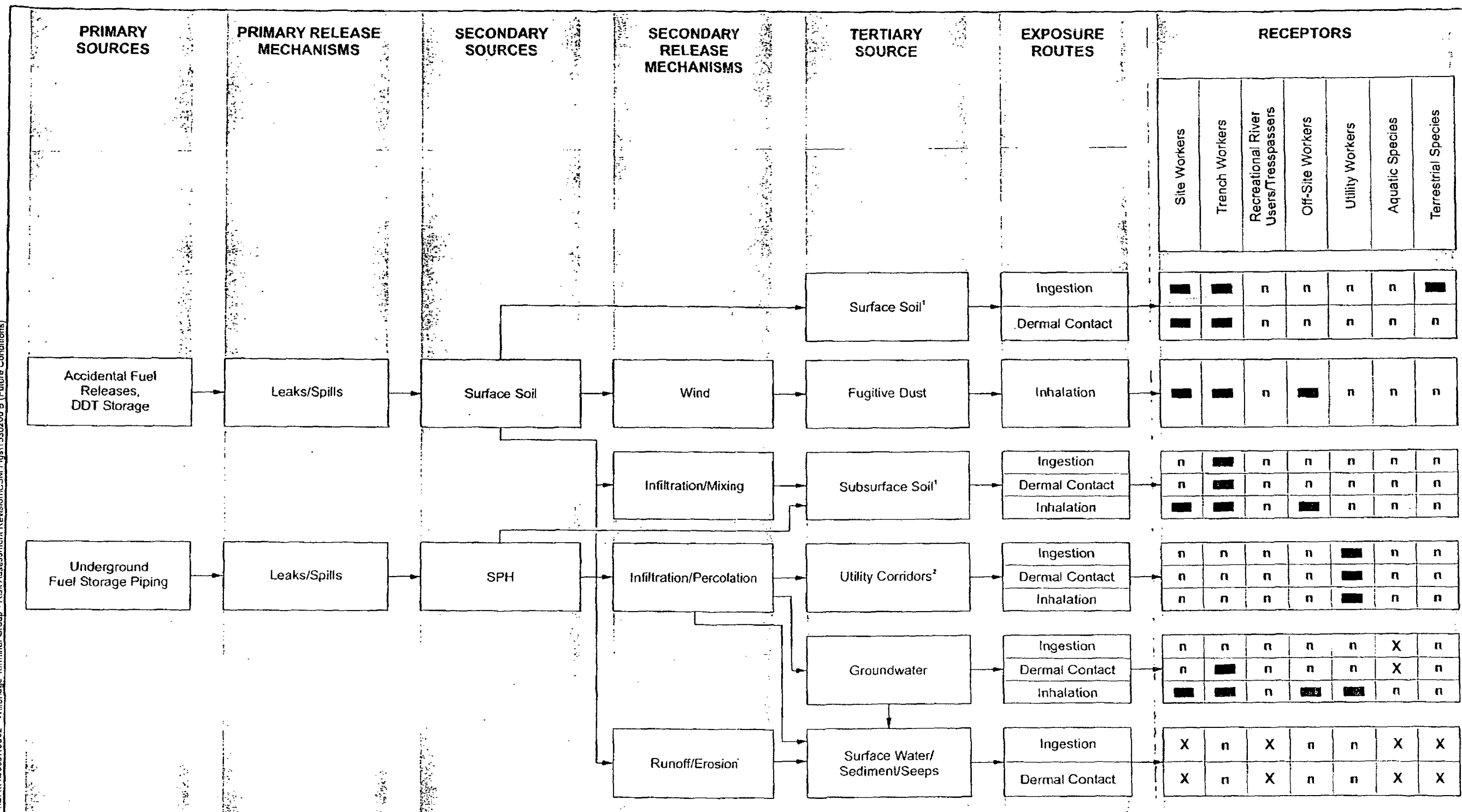
Notes: <sup>1</sup> Does Not Include Surface and Subsurface Soil in Utility Corridor.  
<sup>2</sup> Includes Only Surface and Subsurface Soil in Utility Corridor.  
<sup>3</sup> Landscape Worker Will Only be Evaluated for Chevron and Kinder Morgan Facilities. Landscaping Activities are Complete at the Phillip's Facility.

Legend:

- Complete Exposure Pathway
- X Complete Exposure Pathway, Evaluation will be Completed in Conjunction with CERCLA Activities
- n Incomplete or Insignificant Exposure Pathway

**Conceptual Site Model - Future Conditions**  
**Willbridge Facility Risk Assessment**  
**Willbridge Terminal Group, Portland, Oregon**

F:\DATA\Jobs\15302 - Willbridge Terminal Group - Risk Assessment\Revision\CSM Figs\1530200 B (Future Conditions)



Notes: <sup>1</sup> Does Not Include Surface and Subsurface Soil in Utility Corridor.

<sup>2</sup> Includes Only Surface and Subsurface Soil in Utility Corridor.

**Legend:**

- Complete Exposure Pathway
- X Complete Exposure Pathway, Evaluation will be Completed in Conjunction with CERCLA Activities
- n Incomplete or Insignificant Exposure Pathway



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region Portland Office

2020 SW 4<sup>th</sup> Avenue, Suite 400

Portland, OR 97201-4987

(503) 229-5263

FAX (503) 229-6945

TTY (503) 229-5471

### **CERTIFIED MAIL RETURN RECEIPT REQUESTED**

October 4, 2000

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Martin Cramer  
Tosco Refining Company  
P.O. Box 76  
Portland, OR 97207

Ron Schwab  
Unocal Corporation  
Diversified Businesses  
376 S. Valencia Avenue  
Brea, CA 92823

Frank Fossati  
Shell Oil Products Company  
P.O. Box 219  
Lake Forest, CA 92630-0219

Eric Conard  
GATX  
1363 North Gaffey Street  
San Pedro, CA 90731

### **RE: NOTICE OF NONCOMPLIANCE**

#### **NWR-ECD #00-066**

Failure to Submit Documents Required Under DEQ Order on Consent, WMCSR-NWR-94-06  
Willbridge Bulk Fuels Facilities, DEQ File #1549

Gentlemen:

As required by the current Department of Environmental Quality (DEQ) Order on Consent, WMCSR-NWR-94-06 and subsequent DEQ-approved Remedial Investigation Work Plan, a Draft Remedial Investigation Report was to be submitted to DEQ by September 19, 2000. DEQ had previously advised you by letter dated September 8, 2000, that the implementation schedule provided in the DEQ-approved Remedial Investigation Work Plan became enforceable under the terms of the Order on Consent and that DEQ expected deliverables to be submitted by the dates specified in the schedule.

DEQ did not receive the Draft Remedial Investigation Report by September 19, 2000. However, DEQ received a letter on September 19, 2000, from KHM Environmental Management, notifying DEQ of a change in contractor and an unspecified date in December 2000 for submittal

COPPOR00012459

of the Draft Remedial Investigation Report to DEQ. This modification to the schedule was not discussed with, nor approved in advance by DEQ. On several previous occasions, DEQ had expressed concern over the lack of progress toward completion of the remedial investigation and is unwilling to extend the schedule for completion of the remedial investigation at the Willbridge facilities. As a result, DEQ has determined that the Willbridge Respondents are out of compliance with the Order on Consent.

This Notice of Noncompliance NWR-ECD #00-066 is issued as a result of failure to submit the Draft Remedial Investigation Report by the September 19, 2000, submittal date. The Notice of Noncompliance is issued as a joint and several notice to the Willbridge Respondents. If the Willbridge Respondents fail to submit the Draft Remedial Investigation Report by close of business day on November 6, 2000, the Department will assess stipulated or civil penalties enforcement process per section 7.L. of the Order on Consent or Oregon Administrative Rules 340-12-073. Stipulated or civil penalties will be calculated based on the original due date established in the DEQ-approved Remedial Investigation Work Plan.

If you have any questions concerning this matter you may contact me at 503-229-6900 or Dave St. Louis at 503-229-5532.

Sincerely,



Jill Kiernan, P.E.  
DEQ Project Engineer

cc: Neil Mullane, DEQ NWR Administrator  
Dave St. Louis, DEQ NWR Site Response Mgr  
Les Carlough, DEQ NWR Enforcement Mgr  
Charlie Landman, DEQ WPM  
Kurt Burkholder, DOJ  
Mike Rosen, DEQ NWR Voluntary Cleanup/Portland Harbor Mgr  
Kelly Kline, KHM





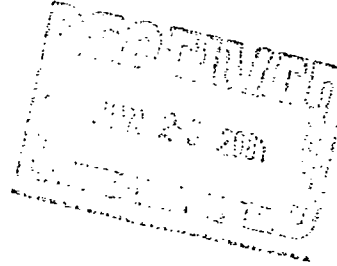
# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
Suite 400  
Portland, OR 97201-4987  
(503) 229-5263 Voice  
TTY (503) 229-5471

June 27, 2001



Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232

RE: Willbridge Bulk Fuel Facilities  
DEQ Approval of the Proposed Interim Action and the Interim Remedial  
Action Engineering Design Report

Dear Kelly:

DEQ has reviewed the report, *Interim Remedial Action Engineering Design Report, Willbridge Facility, Portland, Oregon*, prepared by KHM Environmental Management, Inc. and dated June 8, 2001. DEQ is pleased to provide approval of this report and the proposed interim action to address hydrocarbon seepage into the Willamette River. As documented in the above-referenced report, the proposed interim action involves the installation of a sheet pile cutoff wall around the 60-inch Doane Avenue storm drain, extraction of groundwater and separate-phase hydrocarbons (SPH) from upgradient of the cutoff wall, and treatment of the extracted groundwater and SPH. The proposed interim action is to be conducted under the authority of Section 5.D. of the existing Consent Order, DEQ No. WMCSR-NWR-94-06.

DEQ acknowledges that the construction may be initiated in August 2001 pending issuance of the necessary permits from the Army Corps of Engineers and City of Portland. Please notify me at least 5 working days in advance of initiation of construction activities.

Please feel free to call me at 503-229-6900 if you should have any questions regarding the project.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer



Kelly Kline  
June 27, 2001  
Page 2

cc : Mavis Kent, DEQ/NWR  
Dave St. Louis, DEQ/NWR  
Eric Blischke, DEQ/NWR  
Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Chip Humphrey, EPA  
Judy Linton, COE  
Gerry Koschal, PNG Environmental



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

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March 26, 2001

Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232

RE: Willbridge Bulk Fuel Facilities  
Schedule for Completion of the RI/FS

Dear Kelly:

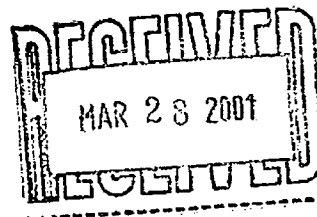
The schedule for completion of the remedial investigation/feasibility study as proposed in your March 15, 2001, letter is acceptable to DEQ. This revised schedule, as presented in your letter, replaces the schedule provided in the DEQ-approved Remedial Investigation Work Plan, dated October 10, 2000. Please be advised that this new schedule is now enforceable under the terms of the Consent Order.

If you should have any questions regarding this matter, please feel free to call me at 503-229-6900.

Sincerely,

Jili Kiernan, P.E.  
Senior Project Engineer

cc: Marty Cramer, TOSCO  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, GATX



DEQ-1

COPPOR00012463



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region Portland Office

2020 SW 4<sup>th</sup> Avenue, Suite 400

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FAX (503) 229-6945

TTY (503) 229-5471

October 16, 2000

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Martin Cramer  
Tosco Refining Company  
P.O. Box 76  
Portland, OR 97207

Ron Schwab  
Unocal Corporation  
Diversified Businesses  
376 S. Valencia Avenue  
Brea, CA 92823

Frank Fossati  
Shell Oil Products Company  
P.O. Box 219  
Lake Forest, CA 92630-0219

Eric Conard  
GATX  
1363 North Gaffey Street  
San Pedro, CA 90731

Post-it* Fax Note		7671	Date	# of pages
To	WARD		From	Kelly
Co./Dept.			Co.	
Phone #			Phone #	
Fax #			Fax #	

**RE: Extension of Due Date for Remedial Investigation Report**  
Willbridge Bulk Fuels Facilities

Gentlemen:

In response to DEQ's Notice of Noncompliance NWR-ECD #00-066, for failure to submit documents required under the Consent Order, Mr. Frank Fossati, on behalf of the Willbridge Respondents, requested that DEQ extend the due date for submittal of the Draft Remedial Investigation (RI) Report to December 15, 2000. The reason for the extension would be to allow for modifications to correct deficiencies of an existing draft RI document prior to submittal by DEQ. DEQ agrees to this extension of the due date for submittal of the Draft RI Report in the interest of receiving a quality report. However, please be advised that if a Draft RI Report is not submitted to DEQ by the close of business on December 15, 2000, DEQ will issue stipulated or civil penalties per section 7.L. of the Order on Consent or Oregon Administrative Rules 340-12-073, calculated from the original due date of September 19, 2000, for the Draft RI Report submittal as established in the DEQ-approved Remedial Investigation Work Plan.

COPPOR00012464



According to the RI/FS Project Schedule, as approved in RI Work Plan, the Final RI Report is to be submitted to DEQ within 56 working days from submittal of the Draft RI Report to DEQ. Due to the delay in submitting the Draft RI Report, the Final RI Report will now be due March 9, 2001. However, as the preparation of the Feasibility Study (FS) Work Plan is not dependent on DEQ approval of the Final RI Report, the due dates for the submittal of the Draft and Final FS Work Plans to DEQ will not change. The Draft FS Work Plan is due March 1, 2001, and the Final FS Work Plan is due April 27, 2001. In addition, DEQ does not believe that it is necessary to delay the preparation of the Feasibility Study Report. As such, in accordance with the schedule, the Draft FS Report will be due to DEQ on June 25, 2001, and the Final FS Report due on September 20, 2001.

Again, be advised that these dates are enforceable under the terms of the Consent Order. Failure to submit the deliverables by these dates will be regarded by DEQ as violations subject to stipulated or civil penalties.

If you have any questions concerning this matter you may contact me at 503-229-6900 or Dave St. Louis at 503-229-5532.

Sincerely,



Jill Kiernan, P.E. *for*  
DEQ Project Engineer

cc: Neil Mullane, DEQ NWR Administrator  
Dave St. Louis, DEQ NWR Site Response Mgr  
Les Carlough, DEQ NWR Enforcement Mgr  
Charlie Landman, DEQ WPM  
Kurt Burkholder, DOJ  
Mike Rosen, DEQ NWR Voluntary Cleanup/Portland Harbor Mgr  
Kelly Kline, KHM





# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

Northwest Region Portland Office

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Portland, OR 97201-4987

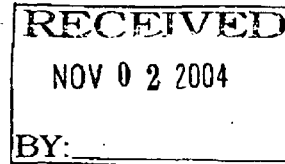
(503) 229-5263

FAX (503) 229-6945

TTY (503) 229-5471

October 29, 2004

Kelly Kline  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223



Re: DEQ Conditional Approval of Remedial Investigation Report for the Willbridge Facility

Dear Kelly:

DEQ has reviewed the August 1, 2003, document, "Final Upland Remedial Investigation Report", for the Willbridge Facility in Portland, Oregon, prepared by KHM Environmental Management, Inc. DEQ has a few remaining issues and comments on this document that should be addressed prior to initiating the Feasibility Study. These comments are attached. Most of these comments were discussed in the technical meeting on October 21, 2004, with you, Scott Miller, and DEQ staff.

DEQ is pleased to provide approval of this report on the condition that the attached comments are addressed and incorporated into an addendum to the Remedial Investigation Report for submittal to DEQ.

### Project Deliverables/Schedule

At our meeting last week we discussed a proposed schedule of tasks and deliverables to complete the remedial investigation and source control evaluation, and initiate the feasibility study. We agreed on the following tasks/deliverables and schedule:

- Revised Preliminary Source Control Evaluation → November 2004  
(To include Construction Completion Report for 60-inch storm sewer cutoff wall as an appendix).
- Remedial Investigation (RI) Addendum → January 2005
- Technical Meeting → February 2005  
(To discuss any remaining comments/issues on Source Control Evaluation and RI Addendum, and Feasibility Study scoping).
- Groundwater Sampling Plan for MTBE → February 2005
- Semi-Annual Groundwater Monitoring → March 2005  
(To include groundwater sampling for MTBE).

COPPOR00012466

Kelly Kline  
October 29, 2004  
Page 2

Please feel free to call me at 503-229-6900 if you have any questions regarding the comments or the proposed schedule.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ  
Paul Seidel, DEQ  
Scott Miller, Delta Environmental  
Eric Conard, Kinder Morgan  
Steve Osborn, Kinder Morgan  
Marty Cramer, ConocoPhillips  
Gerald O'Regan, Chevron Texaco  
Frank Fossati, Shell Oil Products  
Gerard Koschal, SAIC



COPPOR00012467

**DEQ COMMENTS**  
**FINAL UPLAND REMEDIAL INVESTIGATION REPORT**

**WILLBRIDGE FACILITY**

1. The site hydrogeology and contaminant fate and transport need to be better defined and described, particularly with regard to potential contaminant migration from groundwater to the Willamette River, from the fill and alluvium to the underlying basalt unit, and from the site onto off-site properties. This information is needed to define the horizontal and vertical extent of contamination and complete the locality of the facility and hot spot determinations. The discussion should include the following:
  - a. Vertical groundwater gradients. Identify on-site areas where vertical gradients have been characterized. Discuss regional or off-site data if needed to fill data gaps.
  - b. Hydraulic connections between the fill and alluvium, the underlying Columbia River Basalt (CRB) aquifer, and the potential for contaminant migration to the lower CRB aquifer.
  - c. Influences on vertical hydraulic gradient and subsequent contaminant migration as a result of pumping the Chevron Asphalt well.
  - d. Results and interpretation of investigations of the Holbrook Slough, including the transducer study and pump test.
  - e. Hydraulic conductivity of the shallow aquifer, horizontal groundwater flow velocity, groundwater discharge rate to the Willamette River, seasonal variations, effects of tidal fluctuations and river stage on groundwater levels along the waterfront. An estimate of contaminant flux from the site to the river and contaminant loading should be provided.
2. Revise Figure 15, the geologic cross-section, to show the screened intervals of the monitoring wells and well points. Add a legend to differentiate the temporary well points from the monitoring wells. The cross-section should extend through the near-shore Willamette River.
3. Section 3.4 (page 31) states that the purpose of the SVE system installation is to mitigate methane gas generated by the degradation of ethanol in the Tank 60 area of the Chevron terminal. Are there any current risks to site workers due to potential explosive hazards from the methane gas (i.e. methane gas concentrations greater than 1.25% by volume)? Have confined spaces and poorly ventilated areas of nearby buildings, utility vaults, or other spaces been monitored for methane gas on

a routine basis? Please provide the monitoring data and an interpretation of the results to DEQ.

4. For the groundwater investigation results, the trends in data should be presented in time-concentration plots and isoconcentration maps. Describe trends in SPH thicknesses and horizontal and vertical extent. Describe trends in dissolved-phase contaminant concentrations.
5. For the soil investigation results, describe whether there are areas of soil contamination that are current sources of contaminant migration to groundwater. If so, are these areas likely to create a hot spot in groundwater?
6. In Section 9.1, (page 101) regarding the groundwater hot spot determination, the statement that there is currently no impairment to the beneficial use of the existing deeper industrial groundwater supply should be supported by the discussion on vertical contaminant transport (Comment #1). If vertical contaminant transport to the underlying CRB aquifer and to the Chevron Asphalt well is a potential pathway, then groundwater monitoring data from the Chevron Asphalt supply well should be provided.
7. In Section 9.1, (page 102) the statement that the ecological risk assessment results support no significant adverse effects to beneficial surface water uses for the Willamette River is not accurate since the ecological risk assessment did not evaluate risks to aquatic receptors. There is the potential for contaminants in groundwater to migrate to surface water in concentrations that would exceed the ambient water quality criteria, thus creating an adverse impact to surface water. Therefore, hot spots identified for the site should also include both hydrocarbon seeps and dissolved-phased contaminants in groundwater migrating to the river, based on the potential for significant adverse impacts to surface water (i.e. exceedances of ambient water quality criteria).
8. For the soils hot spot evaluation, provide the data sets used for the two spill areas with a comparison to the risk-based, hot spot criteria.
9. For the human health risk assessment, provide the data set and screening criteria used for the off-site worker risk evaluation for the Certain Teed facility. Since contaminated groundwater from the site has migrated onto the Certain Teed facility, the evaluation of risks to off-site workers should include the groundwater monitoring data from the Certain Teed facility.
10. The risk assessment identified MTBE as a contaminant of potential concern (COPCs) in groundwater at the Chevron facility. However, the groundwater analytical data show no results for MTBE in groundwater at the KMLT and ConocoPhillips facilities. This is an apparent data gap. Groundwater from these two facilities should be sampled and analyzed for MTBE. A sampling plan with the

rationale for sampling locations should be submitted to DEQ for review and approval prior to sampling.

11. The human health risk assessment identified potentially unacceptable risk to the Chevron site workers via the indoor inhalation exposure pathway from benzene in groundwater. Additional evaluation of this pathway to determine actual risks should be performed to provide information for the feasibility study. The evaluation may include soil gas or indoor air sampling in areas where benzene concentrations in groundwater exceed the risk-based cleanup concentration (RBC) of 2,700 µg/l for this pathway.
12. The human health and ecological risk assessments did not evaluate risk to the upland receptors from exposure to the hydrocarbon seeps. It is not clear if the source control evaluation will address both the upland and in-water receptor exposures to the seeps. Please clarify how the potential risks to the upland receptors from exposures to seeps will be evaluated.
13. The small wetland near the beach of the KMLT facility is likely receiving groundwater containing COPCs. The wetland was not included as an assessment endpoint in the ecological risk assessment. The wetland may provide riparian zone habitat for amphibians or reptiles and should be addressed.
14. Table 26 in the ecological risk assessment (Appendix E) did not include the risk ratios for plants, invertebrates, or birds. It is unclear from this table why some PAHs with SLVs are shown as CPECs and others are not. Please provide clarification.



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
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(503) 229-5263 Voice  
TTY (503) 229-5471

March 26, 2001

Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232

RE: Willbridge Bulk Fuel Facilities  
Schedule for Completion of the RI/FS

Dear Kelly:

The schedule for completion of the remedial investigation/feasibility study as proposed in your March 15, 2001, letter is acceptable to DEQ. This revised schedule, as presented in your letter, replaces the schedule provided in the DEQ-approved Remedial Investigation Work Plan, dated October 10, 2000. Please be advised that this new schedule is now enforceable under the terms of the Consent Order.

If you should have any questions regarding this matter, please feel free to call me at 503-229-6900.

Sincerely,

Jill Kieman, P.E.  
Senior Project Engineer

cc: Marty Cramer, TOSCO  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, GATX





# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

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March 16, 2005

Kelly Kline  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223

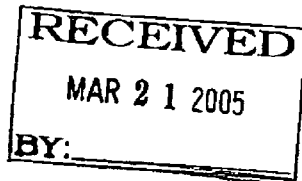
Re: Willbridge Bulk Fuels Facilities  
DEQ Approval of Groundwater Sampling Plan for MTBE Analysis Willbridge  
Terminals, Portland, Oregon

Dear Kelly:

DEQ has reviewed the March 8, 2005, memorandum regarding "Groundwater Sampling Plan for MTBE Analysis, Willbridge Terminals, Portland, Oregon", prepared by Delta Environmental Consultants, Inc. DEQ is pleased to provide approval of this Sampling Plan.

Please feel free to call me at 503-229-6900 if you have any questions regarding the project.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ  
Scott Miller, Delta Environmental  
Eric Conard, Kinder Morgan  
Steve Osborn, Kinder Morgan  
Marty Cramer, ConocoPhillips  
Gerald O'Regan, Chevron Texaco  
Frank Fossati, Shell Oil Products  
Gerard Koschal, Red Hills Environmental

COPPOR00012472





# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

Northwest Region Portland Office

2020 SW 4<sup>th</sup> Avenue, Suite 400

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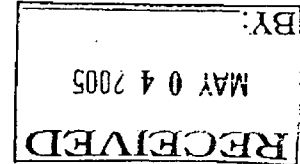
(503) 229-5263

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TTY (503) 229-5471

May 2, 2005

Mr. Steve Osborn  
Remediation Project Manager  
Kinder Morgan Energy Partners  
6050 Pacific Street  
P.O. Box 1318  
Rocklin, CA 95677



RE: Source Control Evaluation and IRAM System Assessment  
Kinder Morgan Linnton Terminal DEQ ECSI No. 1096

Dear Mr. Osborn:

The purpose of this letter is to follow up on the action items discussed during our last project meeting and to provide clarification on contaminant pathway assessment in the context of source control evaluations. During the meeting, Kinder Morgan/Delta agreed to prepare a work plan and schedule for the assessment of the IRAM system's effectiveness. DEQ agreed to provide clarification on the source control evaluation in the context of the Portland Harbor investigation, provide information on the necessity of evaluating the potential storm water contaminant pathway and to help Kinder Morgan prioritize source control activities.

DEQ has received IRAM System Assessment Work Plan, Linnton Terminal submitted by Delta and dated April 26, 2005. DEQ's project team will review the work plan and reply with comments/approval within the next few weeks. Thanks for submitting the workplan in a timely manner.

Based on the review of existing Portland Harbor Agreement, RI Scope of Work and the site specific RI workplan and the subsequent amendments, it is clear that all contaminant migration pathways to the river and river sediments should be evaluated and discussed in the RI. As DEQ stated during the meeting, this includes an assessment of the potential storm water pathway. Greater clarification of source control evaluations at Portland Harbor Upland sites will be provided in the EPA/ODEQ Joint Source Control Strategy (JSCS) which is scheduled to be released in June 2005. Although this document has not been officially released, DEQ staff has been working with responsible parties in the interim to guide remedial investigations and source control evaluations in a direction congruent with the strategy. In accordance with the JSCS, once the site contaminants and associated media have been identified, key potential contaminant pathways that should be evaluated include groundwater, storm water, overland transport/sheet flow, bank erosion, over-water activities and others (NAPL seeps etc...) as appropriate. Since, many if not all of these pathways, will be addressed and discussed in detail in the RI, it will not be necessary to produce a separate source control evaluation document. It will only be necessary to ensure that these topics are discussed in the context of a source control evaluation in the RI.

COPPOR00012473



# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

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March 16, 2005

Kelly Kline  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223

Re: Willbridge Bulk Fuels Facilities  
DEQ Approval of Groundwater Sampling Plan for MTBE Analysis Willbridge  
Terminals, Portland, Oregon

Dear Kelly:

DEQ has reviewed the March 8, 2005, memorandum regarding "Groundwater Sampling Plan for MTBE Analysis, Willbridge Terminals, Portland, Oregon", prepared by Delta Environmental Consultants, Inc. DEQ is pleased to provide approval of this Sampling Plan.

Please feel free to call me at 503-229-6900 if you have any questions regarding the project.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ  
Scott Miller, Delta Environmental  
Eric Conard, Kinder Morgan  
Steve Osborn, Kinder Morgan  
Marty Cramer, ConocoPhillips  
Gerald O'Regan, Chevron Texaco  
Frank Fossati, Shell Oil Products  
Gerard Koschal, Red Hills Environmental

COPPOR00012474



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
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June 2, 1999

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Eric Conard  
GATX Tank Storage Terminals  
Corporation  
P.O. Box 9007  
Long Beach, CA 90810-0007

Irv Jenkins  
Shell Oil Products Company  
777 Walker Street  
P.O. Box 2099  
Houston, TX 77252-2099

Martin Cramer,  
TOSCO Corporation  
5528 Northwest Doane Avenue  
Portland, OR 97210

Ron Schwab  
Unocal Corporation  
Diversified Businesses  
376 S. Valencia Avenue  
Brea, CA 92823

RE: Willbridge Bulk Fuel Facilities  
Request for Data and Quarterly Groundwater Monitoring Progress Reports

Gentlemen:

This letter is written to advise you of DEQ's unsuccessful attempts to obtain data from Pacific Environmental Group (PEG) on the recent sediment sampling event and the Geoprobe investigation along Front Avenue. Since January 1999, both Henning Larsen, with DEQ NW Region's Underground Storage Tank Program, and I have verbally requested this data on several occasions from PEG staff. As of the date of this letter, no data has been received.

This letter is a formal, written request for data under the terms of the Consent Order, No. WMCSR-NWR-94-06, Subsection 7(E)(1). Please provide all raw data, associated QA/QC memoranda, field notes, and laboratory analytical reports for (1) the Willamette River surface water and sediment sampling events conducted by PEG between September 1, 1998, and January 30, 1999; and (2) the soil and groundwater samples from the Geoprobe investigations conducted along Front Avenue by PEG between November 1, 1998, and April 30, 1999. Under the terms of the Consent Order, this requested information should be submitted to DEQ within 10 days. DEQ



should receive this requested information by June 15, 1999. Failure to submit this requested information may result in the issuance of stipulated penalties under Subsection 7(L) of the Consent Order.

On another matter, Subsection 7(F) of the Consent Order requires the submittal of quarterly progress reports, which are to include groundwater monitoring results. As of the date of this letter, the progress reports for the fourth quarter of 1998 (September through November 1998) and the first quarter of 1999 (December 1998 through February 1999) have not been received by DEQ. Please submit these progress reports to DEQ by June 15, 1999. Failure to submit these reports may also result in the issuance of stipulated penalties under Subsection 7(L) of the Consent Order.

Subsection 7(F) of the Consent Order establishes a schedule for the submittal of these progress reports based on the issuance date of the Consent Order. These reports are to be submitted by the 15<sup>th</sup> day of the third month of the quarter. However, DEQ recognizes that additional time is required for lab analytical work, and for data analysis, interpretation, and management. Therefore, DEQ has established that the progress reports be due on the 15<sup>th</sup> of the second month following the end of the reporting period. The schedule for subsequent quarterly reports for 1999 is as follows:

Second Quarter (March to May 1999)	Due 7/15/99
Third Quarter (June to August 1999)	Due 10/15/99
Fourth Quarter (September to November 1999)	Due 1/15/00

If you should have any questions regarding these matters, please feel free to call me at 503-229-6900.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Kelly Kline/PEG  
Dave St. Louis/DEQ  
Henning Larsen/DEQ  
Mike Rosen/DEQ  
Kurt Burkholder/DOJ



# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

Northwest Region Portland Office

2020 SW 4<sup>th</sup> Avenue, Suite 400

Portland, OR 97201-4987

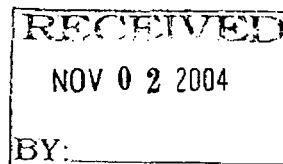
(503) 229-5263

FAX (503) 229-6945

TTY (503) 229-5471

October 29, 2004

Kelly Kline  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223



Re: DEQ Conditional Approval of Remedial Investigation Report for the Willbridge Facility

Dear Kelly:

DEQ has reviewed the August 1, 2003, document, "Final Upland Remedial Investigation Report", for the Willbridge Facility in Portland, Oregon, prepared by KHM Environmental Management, Inc. DEQ has a few remaining issues and comments on this document that should be addressed prior to initiating the Feasibility Study. These comments are attached. Most of these comments were discussed in the technical meeting on October 21, 2004, with you, Scott Miller, and DEQ staff.

DEQ is pleased to provide approval of this report on the condition that the attached comments are addressed and incorporated into an addendum to the Remedial Investigation Report for submittal to DEQ.

### Project Deliverables/Schedule

At our meeting last week we discussed a proposed schedule of tasks and deliverables to complete the remedial investigation and source control evaluation, and initiate the feasibility study. We agreed on the following tasks/deliverables and schedule:

- Revised Preliminary Source Control Evaluation → November 2004  
(To include Construction Completion Report for 60-inch storm sewer cutoff wall as an appendix).
- Remedial Investigation (RI) Addendum → January 2005
- Technical Meeting → February 2005  
(To discuss any remaining comments/issues on Source Control Evaluation and RI Addendum, and Feasibility Study scoping).
- Groundwater Sampling Plan for MTBE → February 2005
- Semi-Annual Groundwater Monitoring → March 2005  
(To include groundwater sampling for MTBE).

COPPOR00012477

Kelly Kline  
October 29, 2004  
Page 2

Please feel free to call me at 503-229-6900 if you have any questions regarding the comments or the proposed schedule.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ  
Paul Seidel, DEQ  
Scott Miller, Delta Environmental  
Eric Conard, Kinder Morgan  
Steve Osborn, Kinder Morgan  
Marty Cramer, ConocoPhillips  
Gerald O'Regan, Chevron Texaco  
Frank Fossati, Shell Oil Products  
Gerard Koschal, SAIC



**DEQ COMMENTS  
FINAL UPLAND REMEDIAL INVESTIGATION REPORT**

**WILLBRIDGE FACILITY**

1. The site hydrogeology and contaminant fate and transport need to be better defined and described, particularly with regard to potential contaminant migration from groundwater to the Willamette River, from the fill and alluvium to the underlying basalt unit, and from the site onto off-site properties. This information is needed to define the horizontal and vertical extent of contamination and complete the locality of the facility and hot spot determinations. The discussion should include the following:
  - a. Vertical groundwater gradients. Identify on-site areas where vertical gradients have been characterized. Discuss regional or off-site data if needed to fill data gaps.
  - b. Hydraulic connections between the fill and alluvium, the underlying Columbia River Basalt (CRB) aquifer, and the potential for contaminant migration to the lower CRB aquifer.
  - c. Influences on vertical hydraulic gradient and subsequent contaminant migration as a result of pumping the Chevron Asphalt well.
  - d. Results and interpretation of investigations of the Holbrook Slough, including the transducer study and pump test.
  - e. Hydraulic conductivity of the shallow aquifer, horizontal groundwater flow velocity, groundwater discharge rate to the Willamette River, seasonal variations, effects of tidal fluctuations and river stage on groundwater levels along the waterfront. An estimate of contaminant flux from the site to the river and contaminant loading should be provided.
2. Revise Figure 15, the geologic cross-section, to show the screened intervals of the monitoring wells and well points. Add a legend to differentiate the temporary well points from the monitoring wells. The cross-section should extend through the near-shore Willamette River.
3. Section 3.4 (page 31) states that the purpose of the SVE system installation is to mitigate methane gas generated by the degradation of ethanol in the Tank 60 area of the Chevron terminal. Are there any current risks to site workers due to potential explosive hazards from the methane gas (i.e. methane gas concentrations greater than 1.25% by volume)? Have confined spaces and poorly ventilated areas of nearby buildings, utility vaults, or other spaces been monitored for methane gas on

a routine basis? Please provide the monitoring data and an interpretation of the results to DEQ.

4. For the groundwater investigation results, the trends in data should be presented in time-concentration plots and isoconcentration maps. Describe trends in SPH thicknesses and horizontal and vertical extent. Describe trends in dissolved-phase contaminant concentrations.
5. For the soil investigation results, describe whether there are areas of soil contamination that are current sources of contaminant migration to groundwater. If so, are these areas likely to create a hot spot in groundwater?
6. In Section 9.1, (page 101) regarding the groundwater hot spot determination, the statement that there is currently no impairment to the beneficial use of the existing deeper industrial groundwater supply should be supported by the discussion on vertical contaminant transport (Comment #1). If vertical contaminant transport to the underlying CRB aquifer and to the Chevron Asphalt well is a potential pathway, then groundwater monitoring data from the Chevron Asphalt supply well should be provided.
7. In Section 9.1, (page 102) the statement that the ecological risk assessment results support no significant adverse effects to beneficial surface water uses for the Willamette River is not accurate since the ecological risk assessment did not evaluate risks to aquatic receptors. There is the potential for contaminants in groundwater to migrate to surface water in concentrations that would exceed the ambient water quality criteria, thus creating an adverse impact to surface water. Therefore, hot spots identified for the site should also include both hydrocarbon seeps and dissolved-phased contaminants in groundwater migrating to the river, based on the potential for significant adverse impacts to surface water (i.e. exceedances of ambient water quality criteria).
8. For the soils hot spot evaluation, provide the data sets used for the two spill areas with a comparison to the risk-based, hot spot criteria.
9. For the human health risk assessment, provide the data set and screening criteria used for the off-site worker risk evaluation for the Certain Teed facility. Since contaminated groundwater from the site has migrated onto the Certain Teed facility, the evaluation of risks to off-site workers should include the groundwater monitoring data from the Certain Teed facility.
10. The risk assessment identified MTBE as a contaminant of potential concern (COPCs) in groundwater at the Chevron facility. However, the groundwater analytical data show no results for MTBE in groundwater at the KMLT and ConocoPhillips facilities. This is an apparent data gap. Groundwater from these two facilities should be sampled and analyzed for MTBE. A sampling plan with the



rationale for sampling locations should be submitted to DEQ for review and approval prior to sampling.

11. The human health risk assessment identified potentially unacceptable risk to the Chevron site workers via the indoor inhalation exposure pathway from benzene in groundwater. Additional evaluation of this pathway to determine actual risks should be performed to provide information for the feasibility study. The evaluation may include soil gas or indoor air sampling in areas where benzene concentrations in groundwater exceed the risk-based cleanup concentration (RBC) of 2,700 µg/l for this pathway.
12. The human health and ecological risk assessments did not evaluate risk to the upland receptors from exposure to the hydrocarbon seeps. It is not clear if the source control evaluation will address both the upland and in-water receptor exposures to the seeps. Please clarify how the potential risks to the upland receptors from exposures to seeps will be evaluated.
13. The small wetland near the beach of the KMLT facility is likely receiving groundwater containing COPCs. The wetland was not included as an assessment endpoint in the ecological risk assessment. The wetland may provide riparian zone habitat for amphibians or reptiles and should be addressed.
14. Table 26 in the ecological risk assessment (Appendix E) did not include the risk ratios for plants, invertebrates, or birds. It is unclear from this table why some PAHs with SLVs are shown as CPECs and others are not. Please provide clarification.



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region Portland Office

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October 16, 2000

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Shell Oil Products Company  
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Lake Forest, CA 92630-0219

Eric Conard  
GATX  
1363 North Gaffey Street  
San Pedro, CA 90731

**RE: Extension of Due Date for Remedial Investigation Report**  
Willbridge Bulk Fuels Facilities

Gentlemen:

In response to DEQ's Notice of Noncompliance NWR-ECD #00-066, for failure to submit documents required under the Consent Order, Mr. Frank Fossati, on behalf of the Willbridge Respondents, requested that DEQ extend the due date for submittal of the Draft Remedial Investigation (RI) Report to December 15, 2000. The reason for the extension would be to allow for modifications to correct deficiencies of an existing draft RI document prior to submittal by DEQ. DEQ agrees to this extension of the due date for submittal of the Draft RI Report in the interest of receiving a quality report. However, please be advised that if a Draft RI Report is not submitted to DEQ by the close of business on December 15, 2000, DEQ will issue stipulated or civil penalties per section 7.L. of the Order on Consent or Oregon Administrative Rules 340-12-073, calculated from the original due date of September 19, 2000, for the Draft RI Report submittal as established in the DEQ-approved Remedial Investigation Work Plan.

COPPOR00012482

*Draft FS April 14, 2001*

According to the RI/FS Project Schedule, as approved in RI Work Plan, the Final RI Report is to be submitted to DEQ within 56 working days from submittal of the Draft RI Report to DEQ. Due to the delay in submitting the Draft RI Report, the Final RI Report will now be due March 9, 2001. However, as the preparation of the Feasibility Study (FS) Work Plan is not dependent on DEQ approval of the Final RI Report, the due dates for the submittal of the Draft and Final FS Work Plans to DEQ will not change. The Draft FS Work Plan is due March 1, 2001, and the Final FS Work Plan is due April 27, 2001. In addition, DEQ does not believe that it is necessary to delay the preparation of the Feasibility Study Report. As such, in accordance with the schedule, the Draft FS Report will be due to DEQ on June 25, 2001, and the Final FS Report due on September 20, 2001.

Again, be advised that these dates are enforceable under the terms of the Consent Order. Failure to submit the deliverables by these dates will be regarded by DEQ as violations subject to stipulated or civil penalties.

If you have any questions concerning this matter you may contact me at 503-229-6900 or Dave St. Louis at 503-229-5532.

Sincerely,

*Jill Kiernan*

Jill Kiernan, P.E. *For*  
DEQ Project Engineer

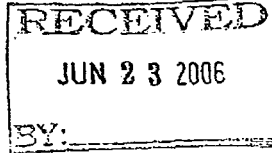
cc: Neil Mullane, DEQ NWR Administrator  
Dave St. Louis, DEQ NWR Site Response Mgr  
Les Carlough, DEQ NWR Enforcement Mgr  
Charlie Landman, DEQ WPM  
Kurt Burkholder, DOJ  
Mike Rosen, DEQ NWR Voluntary Cleanup/Portland Harbor Mgr  
Kelly Kline, KHM





Oregon

Theodore Kulongoski Governor



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June 21, 2006

Tim Browning, R.G.  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223

Re: DEQ Comments/Conditional Approval of Remedial Investigation Report Addendum and  
Feasibility Scoping Document  
Willbridge Bulk Fuels Facilities

Dear Tim:

DEQ has completed our review of the following documents prepared by Delta Environmental Consultants, Inc.: "Remedial Investigation Report Addendum, Willbridge Terminals Group, Portland, Oregon", dated June 30, 2005; and "Feasibility Study Scoping Document, Willbridge Terminals, Portland, Oregon", dated September 20, 2005. DEQ approves these documents provided that the following comments on each of the documents, as described below, are addressed.

**Remedial Investigation Report Addendum**

DEQ finds that the Remedial Investigation Report Addendum (RI Addendum) did not completely address DEQ's previous comments and concerns on the Remedial Investigation Report, which were documented in a letter dated October 29, 2004. The outstanding issues and concerns that remain, referenced by the original DEQ comment number, are identified below. Most of these issues and concerns can be addressed by incorporation into the feasibility study to be completed for the site.

1. DEQ Comment 1b. The potential for contaminant migration from the fill and alluvium to the underlying Columbia River Basalt (CRB) aquifer was not adequately characterized. Downward vertical gradients were observed at the Chevron site and water quality data show that the alluvium has been impacted with site contaminants. Given this information, DEQ assumes that there is a potential for migration of contaminants to the CRB. As such, the CRB aquifer underlying the site will be considered to be within locality of the facility. The feasibility study (FS) must identify and evaluate remedies that protect the beneficial uses of the CRB aquifer.
2. DEQ Comment 1c. Potential impacts to the Chevron Asphalt well as a result of contaminant migration from the site were not evaluated and no data were provided. DEQ

will assume that active pumping of this well could potentially cause contaminant migration toward the well and impair its beneficial use as industrial water supply. Therefore, the FS must identify and evaluate remedies that control the migration of site contaminants to the well and protect the beneficial use of this well.

3. DEQ Comment 1e. No meaningful analysis was provided to address DEQ's questions regarding groundwater discharges and contaminant flux to the Willamette River. DEQ will assume that both separate-phase hydrocarbon (SPH) and dissolved-phase contamination in groundwater are continuing to migrate to the river. Even with the installation of the cut-off wall along the waterfront at the Chevron Texaco and ConocoPhillips facilities there will be areas where migration is still occurring. These areas were identified in the Revised Source Control Evaluation Report (Delta Environmental, Dec 2004) and by subsequent source control evaluation performed by DEQ. The FS must identify and evaluate remedies to control the migration of SPH and dissolved-phase contamination in groundwater to the Willamette River.
4. DEQ Comment 3. Methane monitoring data were provided for the vapor monitoring points for years 2001 through 2003. Are these vapor monitoring points currently being monitored for methane gas? If so, please provide the current methane monitoring data to DEQ. If methane monitoring is not currently being performed, DEQ requests that a methane monitoring program be implemented, based on the 2001 - 2003 data set that shows concentrations of methane gas above the lower explosive limit at four of the monitoring points in the release area. In addition, the RI Addendum had identified structures in the release area, including the gauger's office and several equipment enclosures. The indoor air spaces of all of these identified structures, particularly those that are confined or poorly vented, should be monitored as well. For future methane monitoring events, please provide the data to DEQ for both the vapor monitoring points and indoor air spaces.
5. DEQ Comment 6. The statement that "the information presented in the RI report and the data presented in this report addendum support the statement that there is no impairment to the beneficial use of the existing deeper industrial groundwater supply" is not supported by any data provided to DEQ or by any discussion of contaminant fate and transport (as was requested). Therefore, DEQ assumes that there is the potential for contaminant migration to impact the lower CRB at concentrations that would impair the beneficial use for industrial water supply. The FS must identify and evaluate alternatives that address protection of the beneficial uses of the CRB aquifer.
6. DEQ Comment 7. The Revised Source Control Evaluation for the site, in addition to subsequent analysis done by DEQ, show that contaminants in groundwater are likely migrating to the Willamette River at concentrations that exceed both human health and ecological water quality criteria, resulting in a significant adverse impact on the beneficial uses of surface water. As a result, there is a current hot spot in groundwater



due to the potential for contaminant migration to the Willamette River. The FS must identify and evaluate alternatives that address this hot spot.

- 7 DEQ Comment 9. There appears to be no current risks to off-site workers associated with contaminated groundwater migrating onto the Certain Teed site. However, there is the potential for future risks to these workers as long as groundwater contaminants are migrating from the Kinder Morgan facility onto the Certain Teed property. The potential for off-site migration of contaminants in groundwater from the Kinder Morgan facility onto the Certain Teed property should be continually monitored, with periodic evaluations of risks to off-site Certain Teed workers.
- 8 DEQ Comment 12. Not all of the shoreline areas where seeps have been historically observed will be addressed by the installation of the sheet pile cut-off wall along the waterfront at the Chevron Texaco and ConocoPhillips facilities. The site groundwater monitoring program should include continued observations for seeps along the shoreline. If seeps are observed they should be sampled and analyzed for site contaminants of concern.
- 9 DEQ Comment 13. The statements that "the KMLT beach area is unlikely receiving groundwater containing COPCs above screening criteria", and that "the Saltzman Creek outfall is receiving groundwater COPCs likely associated with the Certain Teed facility" are not supported by the data. In fact the Revised Source Control Evaluation and subsequent source control evaluation by DEQ show that groundwater contaminants have migrated to the KMLT wells along the waterfront at concentrations that exceed human health and ecological screening criteria, indicating that the small wetlands and Saltzman Creek outfall areas have likely been impacted by Willbridge site contaminants of concern as a result of groundwater migration. The FS must include the identification and evaluation of alternatives that address the protection of these areas from contaminant migration in groundwater.

#### **Feasibility Study Scoping Document**

1. Human Health Risk Assessment Summary. Current unacceptable risks have been identified for site workers due to the groundwater/vapor intrusion pathway and trench workers from inhalation of VOCs from groundwater at the Chevron facility (ethanol release area). The FS should evaluate how these unacceptable risks will be addressed. This includes a performance evaluation of the existing vapor extraction system to determine if those unacceptable risks are being fully addressed. If not, then additional measures must be identified and evaluated.
2. The FS should incorporate the outstanding issues and concerns identified for the RI Addendum Report, summarized as follows:



- a The feasibility study must identify and evaluate remedies that control vertical migration of site contaminants to the underlying CRB aquifer and protect the beneficial uses of the CRB aquifer, including the beneficial use of the Chevron Asphalt well for industrial water supply.
- b. The FS must identify and evaluate remedies to control the lateral migration of SPH and dissolved-phase contamination in groundwater to the Willamette River.
- c. The hot spot determination must include the current hot spot in groundwater due to the potential for contaminant migration to the Willamette River that would result in exceedances of water quality criteria. The FS must identify and evaluate alternatives that address this hot spot.
- d The FS should include the identification and evaluation of alternatives that address the protection of the small wetlands and Saltzman Creek outfall areas from contaminant migration in groundwater.

Please feel free to call me at 503-229-6900 if you have any questions regarding the project.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ/NWR  
Paul Seidel, DEQ/NWR  
Brian Pletcher, Delta Environmental  
Robert Truedinger, Kinder Morgan  
Marty Cramer, ConocoPhillips Co.  
Darin Rouse, Chevron Environmental Management  
William Platt, Shell Oil Co.  
Grant Sprick, BBL





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September 22, 2006  
Project ORZ0922GW6

Mr. Henning Larsen  
Oregon Department of Environmental Quality – NW Region  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201

**RE: 2006 Groundwater Monitoring Sampling and Analysis Plan Addendum  
Willbridge Terminals  
Portland, Oregon**

Dear Mr. Larsen:

On behalf of the Willbridge Terminals Group (WTG), Delta Environmental Consultants, Inc. (Delta) has prepared this revised sampling and analysis plan consistent with the Oregon Department of Environmental Quality (DEQ) request for additional groundwater testing from select monitoring wells. The additional monitoring well data is being conducted to comply with a request by the DEQ in a letter dated June 15, 2006, along with comments to the Revised Source Control Evaluation. This additional sampling and analyses will be conducted in conjunction with the next two regularly scheduled semiannual sampling events (September 2006 and March 2007).

It is Delta's understanding that the data collected from the additional wells will be used to complete the groundwater source control evaluation in the areas not addressed by the cutoff walls. Wells to be sampled as part of this evaluation will be wells P-1, U-5 and B-40 at the ConocoPhillips facility; wells CR-1 and B-10 at the Chevron facility; and wells MW-33, MW-34, MW-36, MW-37, and MW-40 at the Kinder Morgan facility.

**FILE COPY**

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A member of:  
The Inogen logo consists of a stylized 'X' shape formed by two overlapping triangles, followed by the word "Inogen" in a bold, sans-serif font. Below "Inogen", the words "Environmental Alliance" are written in a smaller, sans-serif font.

COPPOR00012488



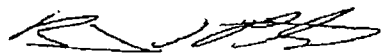
Consistent with the groundwater monitoring quality assurance/ quality control (QA/QC) plan, each monitoring well will be gauged, purged of three well casing volumes, and allowed to recharge to 80% static water level before a sample is collected. Groundwater samples will be submitted to Test America of Beaverton, Oregon for the following analyses.

Compound	Method	MRL (µg/L)
Benzene	EPA Method 8260	0.2
Toluene	EPA Method 8260	0.5
Ethylbenzene	EPA Method 8260	0.5
Total xylenes	EPA Method 8260	0.5
Methyltert-butyl ether	EPA Method 8260	2.0
Naphthalene	EPA Method 8270 SIM	0.01
2-Methylnaphthalene	EPA Method 8270 SIM	0.01
Acenaphthylene	EPA Method 8270 SIM	0.01
Acenaphthene	EPA Method 8270 SIM	0.01
Fluorene	EPA Method 8270 SIM	0.01
Pyrene	EPA Method 8270 SIM	0.01
Benzo(a)anthracene	EPA Method 8270 SIM	0.005
Chrysene	EPA Method 8270 SIM	0.005
Benzo(b)fluoranthene	EPA Method 8270 SIM	0.005
Benzo(k)fluoranthene	EPA Method 8270 SIM	0.005
Benzo(a)pyrene	EPA Method 8270 SIM	0.005
Indeno(1,2,3-cd)pyrene	EPA Method 8270 SIM	0.005
Dibenzo(a,h)anthracene	EPA Method 8270 SIM	0.005
Benzo(g,h,i)perylene	EPA Method 8270 SIM	0.005
Arsenic	EPA Method 6020 ICPMS	0.800
Cadmium	EPA Method 6020 ICPMS	0.075
Chromium	EPA Method 6020 ICPMS	0.800
Copper	EPA Method 6020 ICPMS	1.60
Lead	EPA Method 6020 ICPMS	0.432
Mercury	EPA Method 1631M	0.005
Selenium	EPA Method 6020 ICPMS	1.60
Silver	EPA Method 6020 ICPMS	0.800
Zinc	EPA Method 6020 ICPMS	4.00

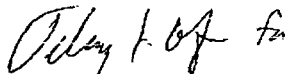
Analytical results from the additional testing will be added to the project database and compared to applicable screening level values (SLVs) presented in the Portland Harbor Joint Source Control Strategy guidance document dated December 2005 and evaluated in the next semiannual groundwater monitoring report.

Delta appreciates your assistance with this project. Please call either of the undersigned if you have any questions regarding the contents of this proposal.

Sincerely,  
**Delta Environmental Consultants, Inc.**



Brian J Pletcher, R.G.  
Senior Project Geologist



Tim Browning, R.G.  
Senior Project Geologist

cc: Mike Noll, ConocoPhillips  
Darin Rouse, Chevron Environmental Management Company  
Robert Truedinger, KMEP  
Grant Sprick, BBL



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## LETTER OF TRANSMITTAL

---

<b>To:</b>	Ms. Jill Kiernan	<b>From:</b>	Kelly Kline
<b>Company:</b>	Oregon DEQ-Northwest Region 2020 SW 4 <sup>th</sup> Avenue, Suite 400 Portland, OR 97201	<b>Date:</b>	August 13, 2003
<b>Re:</b>	Willbridge RI	<b>Project No:</b>	B17-01G

---

Jill:

Enclosed are three (3) copies of page 'x' of the modified Willbridge RI Table of Contents and Figure 46, which was inadvertently left out of the copies delivered to you previously. Per our discussion, please replace these pages in your copies of the RI reports. We apologize for any inconvenience.

Respectfully yours,  
**Delta Environmental Consultants, Inc.**

A handwritten signature in black ink that reads "Kelly A. Kline". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Kelly A. Kline  
Senior Project Geologist  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223  
(503) 639-8098

A member of:

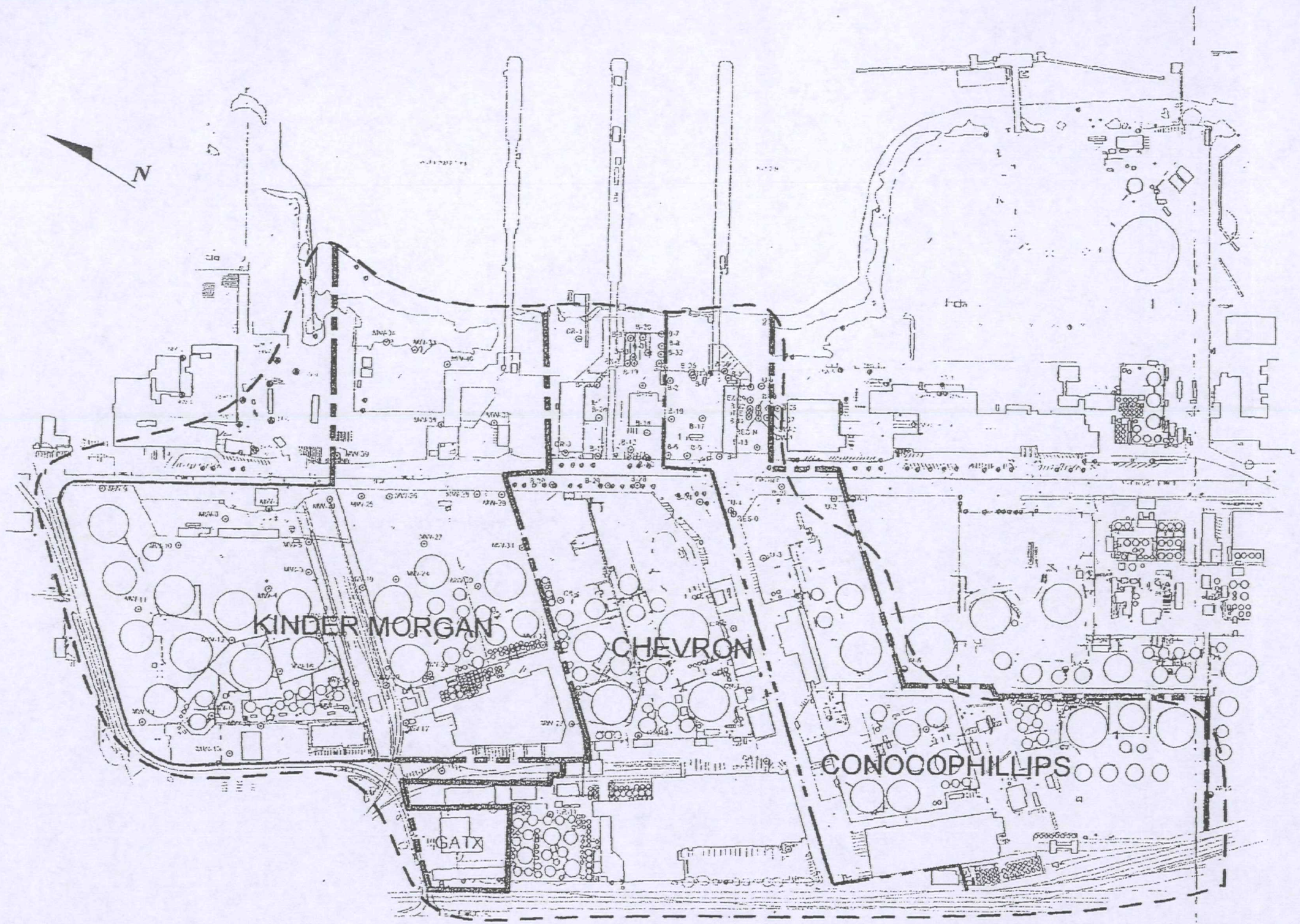


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**LEGEND**

--- Locality of Facility

**KHM**

ENVIRONMENTAL  
MANAGEMENT INC.

Locality of Facility Map

Willbidge Facility  
Remedial Investigation  
Portland, Oregon

DATE	June 2003	PROJECT	B17-01G	FIGURE	46
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**Portland Office**

April 11, 1995

OPE39281.IA.FP

Ms. Jill Kiernan, P.E.  
Oregon Department of Environmental Quality  
Waste Management and Cleanup  
2020 S.W. 4th Avenue Suite 400  
Portland, OR 97201-4987

DEPT OF ENVIRONMENTAL QUALITY  
RECEIVED

APR 12 1995

NORTHWEST REGION

Subject: Response to DEQ Comments  
Willbridge RI/FS Interim Action Work Plan

This letter summarizes the Shell, Chevron, and Unocal (Willbridge Potentially Responsible Party [PRP] Group) response to Oregon Department of Environmental Quality (DEQ) comments on the draft Interim Action (IA) Work Plan for the Willbridge site. This letter also discusses the Remedial Investigation/Feasibility Study (RI/FS) Work Plan schedule and the interim action Field Coordination Plan. In general, this letter summarizes the discussions we had with you during our March 30, 1995 meeting. It is our understanding that DEQ generally concurs with these responses and discussions and that the draft IA Work Plan and this letter, taken together, represent an IA Work Plan that is acceptable to DEQ.

***Responses to DEQ Comments***

The responses to DEQ comments are presented on a comment-by-comment basis by first repeating the DEQ comment and then presenting our response.

**GENERAL COMMENTS:**

1. DEQ agrees that interim actions are necessary to address immediate potential risks to human health and the environment and concurs with the proposal to continue the operation of the Holbrook Slough cutoff trench and the new Doane Avenue storm drain containment system (RES-New) in an effort to control hydrocarbon seepage into the Willamette River. DEQ also concurs with the free product recovery proposal using existing wells. However, it is apparent that these systems are not achieving complete containment of the seepage of hydrocarbon contaminants into the

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COPPOR00012494

Willamette River. The continuing seepage of contaminants despite the operation of the existing containment systems, warrants the need for additional, more immediate, containment measures beyond what is proposed.

DEQ recommends that the Interim Action Plan include a proposal to evaluate additional measures, specifically, expansion of the cutoff trench and/or storm drain containment system or the addition of a new containment system. This evaluation can be conducted as a phased approach; first evaluating the performance of the existing systems, and second, evaluating additional containment alternatives.

**PRP GROUP RESPONSE:** We agree with DEQ that addressing petroleum product seeps into the Willamette River is the primary purpose of the interim action and that until the seeps are sufficiently addressed, the scope of the interim action needs to be continuously reviewed.

The general philosophy of the interim action program is based on the "observational approach" where the interim action is implemented in deliberate and incremental steps. The initial step of the interim action will be implemented and extensive monitoring performed to assess performance and effectiveness of the product recovery equipment and to gain further understanding of the site subsurface conditions. Subsequent incremental steps of the interim action will then be developed and implemented based on the monitoring results. As the interim action incrementally progresses, each subsequent interim action step will be based on the monitoring results of the previous steps. This approach is illustrated by the incremental implementation (Phase 1 and Phase 2) of the free product removal program outlined in the IA Work Plan. This incremental, observational method-based approach is appropriate given the historical difficulties in implementing cleanup actions at the site (including the recent attempt to address seeps by pumping from RES-New at Outfall No. 22 [New Doane Avenue outfall]) and the fact that the seeps into the river have been occurring for decades.

Following implementation of the interim action approach, we agree that if after approximately six months the seeps are not effectively reduced, it will be necessary to consider additional or different interim action activities. Additional interim action activities that could be considered include cutoff trenches and dual pump water table depression and free product recovery well systems. Consistent with our overall approach, we will consider these activities if the initial interim action activities are not effective in addressing the seeps. Consideration of these additional activities would likely include some limited, focused investigations and detailed analysis and engineering.

**SPECIFIC COMMENTS:**

1. Section 2.1.2, page 2-4. Identify locations in the Saltzman Creek flume where hydrocarbon seepage was observed and indicate whether or not the seepage is still

ongoing. If seepage is still occurring, additional hydrocarbon recovery efforts should be considered in this area.

**PRP GROUP RESPONSE:** An historical report notes that seeps into the Saltzman Creek flume were observed just west of the intersection of the flume and Front Avenue in the early 1980's or late 1970's. Seeps into the flume are not currently occurring.

2. Section 2.1.2, page 2-4. Identify on a map the locations of the abandoned monitoring wells, W-1 to W-39, on the Shell property and provide the details on how they were abandoned. Also, provide the location of the 12-inch product recovery well.

**PRP GROUP RESPONSE:** This information is available and will be presented in the RI/FS Work Plan.

3. Section 2.1.4, Figure 2-4. Clarify if the groundwater elevations shown in this figure are corrected for the presence of free-phase hydrocarbon.

**PRP GROUP RESPONSE:** All groundwater elevations in tables and figures are corrected for the presence of free-phase hydrocarbons.

4. Section 2.1.6, page 2-8. Provide a map showing the locations and the elevation profiles of all underground utilities at the Willbridge site.

*What has CH2M Hill done  
on the utilities maps to  
date*

**PRP GROUP RESPONSE:** Developing a map of the buried utilities along Front Avenue, Doane Avenue, and west of the site in the area of the railroad corridor and St. Helens Road will be an important element in the RI/FS Work Plan. The presence of such buried utilities are anticipated to influence subsurface contaminant migration. Information regarding buried utilities within the walled tank farms is much more limited and will be pursued only where the perimeter utility data suggest potential preferential migration pathways into/out of the tank farm areas. This is consistent with the anticipated overall approach to the RI of focusing on the perimeter of the site.

5. Sections 2.2.1 and 2.2.2. The references to maximum contaminant levels in groundwater and risk-based cleanup levels should be deleted as cleanup levels have not yet been established for the Willbridge site.

**PRP GROUP RESPONSE:** We will refer to potential cleanup levels as "preliminary screening risk concentrations" in future documents.

6. Section 2.2.3, page 2-10. Investigation of contamination due to gasoline additives should include 1,2-dibromoethane as well as lead and 1,2-dichloroethane unless



historical information is adequate to rule these out as contaminants of concern. Consideration should be given to including analyses for all of these compounds in the groundwater monitoring program at this time in order to more effectively develop the necessary site characterization information.

**PRP GROUP RESPONSE:** Volatile organics and metals have been analyzed during previous sampling events and the results have not suggested that they are chemicals of concern at the site. We will include the results of these previous analyses in the RI/FS Work Plan.

7. Section 2.3. Historical hydrocarbon thickness and water level data should be tabulated and provided. Additionally, complete summaries of existing groundwater analyses should be provided to complete the data presented in Tables 2-3 and 2-4.

**PRP GROUP RESPONSE:** For the purposes of the IA Work Plan we included historical free product thickness data from selected locations on a figure. We have also tabulated the data and will present it in the RI/FS Work Plan.

8. Section 2.3.1. Figure 2-5 appears to present sufficient data on the free-phase hydrocarbon thickness to be able to generate a contour map of the hydrocarbon thickness. This would allow an initial estimate to be made of the total amount of hydrocarbon present in the subsurface. Such a map should be used to evaluate the areas where additional monitoring wells may be needed, to expand hydrocarbon recovery operations, or complete delineation of the extent of contamination.

**PRP GROUP RESPONSE:** We do not believe that it is appropriate to draw free product thickness contours on the site map. Because of the highly variable product thickness values over time and between wells in close proximity, the typical lack of correlation between product thicknesses in wells and the adjacent formation, and the silty nature of the site soil, it is not appropriate to infer continuous, uniform zones of free product from product thicknesses in individual wells. Drawing contours of inferred product thicknesses on a site map, if they could even be reasonably drawn within the limits of the data, would oversimplify and misrepresent the complex nature of the free product in the subsurface at the Willbridge site. The free product removal program and associated monitoring being performed as part of the interim action will directly identify and assess the specific areas where free product can be recovered and areas where additional explorations and product recovery activities may be appropriate.

*this is good for our cases of not making a big of SPH.*

9. Section 2.3.1. No data is presented regarding the occurrence of free-phase hydrocarbon north and east of the Shell facility or on the south end of the Unocal

facility. This should be evaluated and additional investigation or monitoring performed as appropriate.

**PRP GROUP RESPONSE:** Investigations in the eastern portion of the Shell facility and in the southern portion of the Unocal site will be considered in the RI/FS Work Plan.

10. Section 2.4.1. A more technical evaluation of the potential effectiveness of the water table depression wells should be performed, perhaps including closely monitored field tests. It would appear that the effectiveness of such wells in the Holbrook Slough area (IT-E, IT-W and B-33) was limited by complex subsurface conditions (stratigraphy and utilities). The effectiveness of RES-Old is unknown and the effectiveness of the Shell 12-inch recovery well was suggested to be limited due to system design. Such wells may still be effective recovery methods if sited and designed properly.

**PRP GROUP RESPONSE:** As discussed in our response to the General Comments, the incremental implementation of the interim action will include consideration of water table depression wells and other active free product recovery and seepage control methods, if the initial interim action activities are not effective. The historical ineffectiveness of previous groundwater and active free product recovery systems at the site, including those cited in DEQ's letter and the recently abandoned efforts in RES-New at Outfall No. 22 indicate that implementation of these types of systems must be undertaken carefully and with detailed consideration.

11. Section 2.4.2, page 2-22. Identify reasons for discontinuing the operation of the RES-Old recovery system.

**PRP GROUP RESPONSE:** RES-Old was discontinued due to small volumes of product being recovered and the regulatory changes which made management of the recovered groundwater problematic.

*What about our discharge?*

12. Section 2.4.2, page 2-22. Include a copy of the temporary NPDES discharge permit as an Appendix to this Interim Action Plan.

**PRP GROUP RESPONSE:** Groundwater recovery is no longer being performed from RES-New near Outfall No. 22. Therefore, the temporary NPDES permit was allowed to expire and a new permit was not obtained.

*Let's get a copy of this temp NPDES permit.*

13. Section 2.5, page 2-23. Details of the tank and piping integrity testing program should be provided. Tank bottoms and underground piping that have been inspected

or replaced should be identified. A list of additional work to be performed should also be provided, along with a schedule for its completion.

**PRP GROUP RESPONSE:** The Willbridge facilities adhere to API standards regarding tank and piping inspections and integrity testing. These activities and routine maintenance are consistently performed at the three facilities. A complete listing of all of the inspection, testing, and repairs performed on the three facilities over the past 70 years is not practicable. The Preliminary Assessments for the three facilities provide the historical records of releases along with the associated tank or pipeline, if applicable. The RI/FS Work Plan will discuss in general the API standards performed and the tank and piping containment features at the three facilities.

*Let's ask PRPs about testing programs.*

14. Section 4.1.1, page 4-2. The monitoring program for the Holbrook Slough cutoff trench should include a determination of product recovery rates.

**PRP GROUP RESPONSE:** The Holbrook Slough cutoff trench uses a total fluids pump to transfer the water/product mixture to the Chevron waste water treatment system where it is combined with the other facility waste water streams. As a result, it is not possible to determine the volume of free product recovered. The interim action monitoring program will include periodic monitoring of a pump cycle counter on the pump so that the total volume of water/product mixture pumped from the trench can be monitored.

15. Section 4.1.1, page 4-2. A systems performance evaluation should be conducted on the cutoff trench to determine if modifications or expansion of the system are appropriate. The work plan should specifically identify performance measures to be evaluated, data requirements, and proposed modelling efforts, and include a schedule for conducting this performance evaluation. The evaluation should determine the extent of capture of the free product due to the operation of the trench.

**PRP GROUP RESPONSE:** The immediate potential threat to the environment being addressed by the interim action is the seepage of petroleum product into the Willamette River. Thus, the ultimate measure of the effectiveness of the interim action is whether the seeps are reduced or eliminated. The seep/sheen monitoring will provide a direct performance evaluation of the interim action program. Although the other monitoring activities such as product thickness measurements and free product recovery volumes will provide an indirect measurement of the interim action effectiveness, the primary purpose of these monitoring activities is to obtain a greater understanding of the subsurface conditions in the areas where free product is present. This additional subsurface understanding will be used in the assessment of potential alternative or additional interim actions if the performance monitoring indicates that the initial interim action is not sufficiently effective.

September 17, 1997  
Project 1115-099.3A

Ms. Jill Kiernan, P.E.  
Waste Management and Cleanup Division  
Oregon Department of Environmental Quality  
2020 Southwest Fourth Avenue, Suite 400  
Portland, Oregon 97201-4987

Re: Response to DEQ Comments  
Interim Action Work Plan  
Willbridge Terminals  
Portland, Oregon

Dear Ms. Kiernan:

Pacific Environmental Group, Inc. (PACIFIC), on behalf of the Willbridge responsible parties (RPs) copied below, is pleased to submit this letter in response to your comments regarding the Interim Action Work Plan for the Willbridge Terminals dated June 11, 1997. PACIFIC has reviewed your comments concerning the Work Plan, and has prepared the following responses.

Comment:

- 1. DEQ encourages and supports interim remedial actions at the site to address ongoing seepage of hydrocarbons into the Willamette River. Please be aware that approval of this interim remedial action does not preclude DEQ from selecting other or additional remedial measures as part of the final remedy for the site. Additionally, the implementation of this interim remedial action does not release the respondents from their obligations of completing a remedial investigation at the site to determine the nature and extent of contamination, identify migration pathways, and evaluate risks to human health and the environment. DEQ will not accept any delays with the initiation or conductance of the remedial investigation as a result of the implementation of this interim remedial action.*

Response:

PACIFIC recognizes that the implementation of this work plan does not release the respondents from their obligations to complete the RI/FS at the facility. PACIFIC assures DEQ that the Interim Remedial Actions proposed for the site in no way will delay the RI/FS process.

Comment:

1. *DEQ supports construction of the cutoff wall around the 60-inch Doane Avenue storm drain as this storm drain has been identified as an obvious, continuing migration pathway for hydrocarbon seepage into the Willamette River. However, at this time, DEQ does not support the additional interim remedial actions proposed for the Holbrook trench or the old, abandoned Doane Lake 27-inch storm drain, as contaminant extent and migration in these areas has not been adequately characterized. DEQ feels that a better understanding of the contaminant extent and migration pathways in these areas is necessary in order to facilitate the development of protective, effective, and cost-effective remedial actions. This additional contaminant characterization would be more appropriately addressed during the remedial investigation phase. Upon completion of adequate characterization of contaminant extent and migration pathways in these areas during the remedial investigation, additional remedial alternatives, if deemed necessary for protection of human health and the environment, may be developed as either interim measures or in the feasibility study.*

Response:

PACIFIC recognizes that additional work needs to be completed in the area of the old 27-inch storm drain before selecting an appropriate interim remedial action. PACIFIC will prepare a work plan for additional work to be performed in this area, and will submit to DEQ for review under a separate cover; this will allow an investigation of the 27-inch drain to proceed unimpeded by the remedial investigation process. Field work around the old 27-inch storm drain line will not commence until DEQ has had a chance to review and comment on the work plan. It is PACIFIC's desire to implement these measures as interim remedial actions so they can be implemented sooner rather than wait for the completion of the feasibility study.

*Comment:*

1. *In general, the work plan lacks sufficient detail for DEQ staff to fully evaluate the work being proposed. DEQ requests that additional details of the proposed work be submitted as a design report. At the minimum, the design report should contain the following:*
  - a) *detailed description of the interim action to be performed.*
  - b) *design objectives, criteria, and standards.*
  - c) *final drawings.*
  - d) *final specifications.*
  - e) *construction schedule.*
  - f) *management/disposal plan for contaminated soils and groundwater removed during construction, including and*
  - g) *results of the tracer test, geoprobe, investigation, and any other pertinent technical or engineering studies conducted for supporting the design of the interim action.*

*Response:*

PACIFIC will submit a Barrier Wall Installation Design Report as requested by DEQ prior to initiating fieldwork around the 60-inch storm drain at the Tosco facility. A detailed description of the interim actions around the 60-inch storm drain including final design drawings, objectives of the proposed work, construction schedules, and final specifications will be included in the report. The report will also contain a disposal plan for impacted soils and groundwater removed during construction activities. PACIFIC is in the process of obtaining an Encroachment Permit from the City of Portland's Bureau of Environmental Services (BES), and copies of the Permit will be included in the report. This report will be submitted to DEQ by September 24, 1997.

*Comment:*

1. *DEQ concurs with automated SPH recovery at selected Tosco wells. DEQ requests that additional details regarding the locations of the specific recovery wells be submitted.*

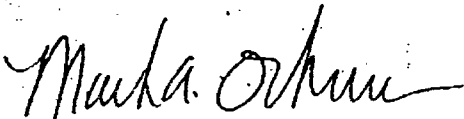
Response:

Specific details on automated SPH recovery at the Tosco site have not been finalized. Specific details on the number and location of wells; including details on recovery equipment and methodology to be used will be submitted to DEQ for review prior to initiating automated SPH recovery at the Tosco facility. Again, this action will be undertaken as part of the interim remedial action and will not wait for the feasibility study to be completed.

If you have any questions about the contents of this letter, please call us.

Sincerely,

**PACIFIC Environmental Group, Inc.**



Mark Ochsner  
Project Hydrogeologist



Lance Geselbracht, P.E.  
Senior Engineer

cc: Mr. Martin Cramer, Tosco Marketing Company  
Mr. Rene White, Chevron Products Company  
Mr. Irv Jenkins, Shell Oil Products Company  
Mr. Eric Conard, GATX  
Ms. Nanci Snyder, City of Portland - Environmental Services

Response:

Specific details on automated SPH recovery at the Tosco site have not been finalized. Specific details on the number and location of wells; including details on recovery equipment and methodology to be used will be submitted to DEQ for review prior to initiating automated SPH recovery at the Tosco facility. Again, this action will be undertaken as part of the interim remedial action and will not wait for the feasibility study to be completed.

If you have any questions about the contents of this letter, please call us.

Sincerely,

**PACIFIC Environmental Group, Inc.**

Mark Ochsner  
Project Hydrogeologist

Lance Geselbracht, P.E.  
Senior Engineer

cc: Mr. Martin Cramer, Tosco Marketing Company  
Mr. Rene White, Chevron Products Company  
Mr. Irv Jenkins, Shell Oil Products Company  
Mr. Eric Conard, GATX  
Ms. Nanci Snyder, City of Portland - Environmental Services





February 18, 1998

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

NORTHWEST REGION

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GATX Tank Storage Terminals Corporation  
P.O. Box 9007  
Long Beach, CA 90810-0007

RE: Willbridge Bulk Fuel Facilities  
DEQ Comments on Remedial Investigation Work Plan

Gentlemen:

Enclosed are DEQ's comments on the *Draft Remedial Investigation Work Plan, Willbridge Facility, Portland, Oregon*, prepared by Pacific Environmental Group and dated September 8, 1997.

DEQ would encourage a meeting to discuss these comments. After you have had a chance to review these comments, please call me to set up a meeting.

If you should have any questions regarding this matter, please feel free to call me at 503-229- 6900.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

Attachment

cc w/attachment: Mavis Kent, DEQ/NWR  
Bruce Hope, DEQ/WMC

cc: Dave St. Louis, DEQ/NWR  
Andree Pollock, DEQ/NWR

John A. Kitzhaber  
Governor



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COPPOR00012505

**DEQ COMMENTS ON 9/8/97 DRAFT  
REMEDIAL INVESTIGATION WORK PLAN**

**GENERAL COMMENTS**

1. Since the issuance of the Consent Order in 1994, DEQ has been providing oversight of the cleanup activities conducted at the site. In the process of reviewing and evaluating the interim action work plans and groundwater monitoring reports, DEQ had provided comments and identified several informational needs and data gaps that are necessary for the adequate characterization of site and evaluating performance of the interim action activities. Most of these previous comments had been addressed, however, some were deferred to the remedial investigation (RI) phase of work. The following is a listing of those deferred items which do not appear to be addressed in this work plan. DEQ still regards these informational needs and data gaps as important items that should be addressed in this RI Work Plan.

The original comments can be found in DEQ's letter of February 28, 1995, addressed to Ross Rieke and Scott McKinley of CH2M Hill regarding "DEQ Comments on Draft Interim Action Plan for Willbridge Facilities", and the subsequent response letter dated April 11, 1995, to Jill Kiernan at DEQ from Ross Rieke regarding, "Response to DEQ Comments, Willbridge RI/FS Interim Action Work Plan".

- a) An objective of the remedial investigation is to identify contaminant migration pathways. While two underground storm sewer lines at the site have already been identified as migration pathways, other buried utilities could be acting as contaminant migration pathways. Accordingly, the RI Work Plan should address how releases from other underground utilities will be identified and evaluated. Additionally, a map showing the locations and elevation profiles of all underground utilities along the perimeter of the site to include Front Avenue, Doane Avenue, and west of the site in the area of the railroad corridor and St. Helens Road should be provided.
- b) The inclusion of gasoline additives, such as 1,2-dibromoethane and 1,2-dichloroethane, as contaminants of concern at the site should be evaluated.
- c) Investigations should be conducted to evaluate the occurrence of free-phase hydrocarbon in the areas north and east of the GATX facility and on the south end of the TOSCO facility.
- d) The RI Work Plan should discuss, in general, the performance of tank and piping inspections and integrity testing in accordance with API standards and tank and piping containment features at the three facilities.

2. In a letter addressed to Pacific Environmental Group and dated September 4, 1997, providing DEQ comments on the Interim Action Work Plan, DEQ requested that additional characterization of the contaminant extent and migration pathways in the area of the Holbrook trench and the old, abandoned 27-inch storm drain be conducted during the remedial investigation. The RI Work Plan should include this additional characterization.
3. DEQ's Site Response Program has been providing oversight of the cleanup activities conducted at the site related to interim remedial actions, groundwater monitoring, and remedial investigations. Other DEQ programs that have been involved in assessment and cleanup activities at the site include the Site Assessment Program, Underground Storage Tank Program, and Spill Response Program. Since the Site Response Program has assumed the lead role in coordination of the cleanup efforts, there have been several incidences that have been referred or transferred to Site Response from these other programs for incorporation into the site-wide remedial investigation.

The following is a listing of incidences referred to Site Response that need to be addressed in this RI Work Plan. Details of these incidences are provided in Attachment A. The work plan should address these incidences with a discussion summarizing the incident, available sampling results, cleanup actions taken, and recommendations for further actions, if needed. Further actions may include additional sampling and/or remediation.

- a) **GS Roofing:** Possible off-site migration of contaminants in groundwater from the GATX facility onto the GS Roofing site. Note that DEQ had previously requested that this issue be addressed by letter dated November 19, 1996, addressed to Mr. Irv Jenkins at Shell Oil Company.
- b) **McCall Oil/Great Western Chemical:** Possible off-site migration of contaminants in groundwater from the TOSCO facility on the McCall Oil/Great Western Chemical site.
- c) **Chevron UST Decommissioning:** (UST #26-94-072).
- d) **Unocal UST Decommissioning:** (UST #26-94-6015).
- e) **Unocal UST Decommissioning:** (UST #26-97-0577).
- f) **GATX Spill:** (OERS #26-2921) Jet fuel spill occurring on 10/18/96 between Tanks 2 and 52.
- g) **Unocal Spill:** (OERS #97-0545) Gasoline spill on 2/22/97 at Tank 3411.

h) **Unocal Spill:** (OERS #95-261) Oil additive spill on 11/3/95 near Tank 2783.

#### SPECIFIC COMMENTS

4. Sections 2.1, 2.2. These sections should be included in the later section presenting the conceptual site model (Sec 3.0). Section 2.0 should be renamed "Facility Description", and focus on describing the historical and current operations at all of the separate properties as currently structured.
5. Section 2.1. It should be noted in this section that the "Tualatin Mountains" are actually Forrest Park, a sizable area of significant wildlife habitat and the largest urban park in the country.
6. Section 2.2.2. An effort was made to list plant species by scientific name and the same should be done for possible animal species. The "waterfowl" sighted should be specified as these are generally a concern of the Migratory Bird Treaty Act.
7. Figure 2-1. The boundaries of the Willbridge facility should be clearly delineated on this figure.
8. Figure 2-2. The boundaries of the Willbridge facility should be clearly delineated on this figure so as to distinguish this site from other cleanup sites in the area. In addition, the GATX, Chevron, and TOSCO sites should be differentiated on this base map such that the five figures that follow it can be keyed in to the base map.
9. Section 2.3.1. This section should include a discussion of the Chevron 6,000 gallon underground storage tank (UST). Table 2-2 and Figure 2-3 should also be revised to include this UST.
10. Figure 2-3. This figure should be revised to include the waste management and disposal areas at the site, including the tank bottom sludge disposal areas, oil/water separators and hydrocleaners, loading racks and areas, Tank 108, and the drum reconditioning area.
11. Section 2.3.2. This section should include a discussion of the GATX jet fuel spill on 10/18/96. Table 2-4 and Figure 2-4 should be revised to include this spill.
12. Figure 2-4. This figure should be revised to include the waste management and disposal areas at the site, including tank bottom sludge disposal areas, oil/water separators, Tanks 85 and 140, DDT storage area, and loading racks and areas.

13. Section 2.3.3. Update this section to include a discussion of the Unocal USTs and recent spills. Table 2-6 and Figure 2-7 should be revised to include these releases.
14. Figure 2-7. This figure should be revised to include the waste management and disposal areas at the site, including tank bottom sludge disposal areas, oil/water separators, Tanks 36 and 4223, and loading racks and areas.
15. Section 3.0. This section should be singular: Conceptual Site Model. There is usually only one "site model". This section should open with a discussion of what a conceptual site model is and what it does: establish geologic/hydrogeologic conditions, identify contaminant migration pathways and receptors, aid in determining locality of the facility, and identification of data gaps.
16. Section 3.1, page 12. For the human health risk assessment, if a screening step is contemplated, it may be clearer to designate contaminants that haven't been screened as "Contaminants of Interest (COIs)", those that have been screened as "Contaminants of Potential Concern (COPCs)", and those that, following a baseline risk assessment, do not meet acceptable risk levels, as "Contaminants of Concern (COCs)".
17. Section 3.1, page 12. In the second paragraph, the text implies that COPCs were specified in the DEQ Consent Order. This is not the case, rather the Consent Order requires the identification of all site-related hazardous substances which may have been released into the environment.
18. Section 3.1. DEQ has conducted a review of past investigations conducted at the site, including the analytical data. Several constituents, other than those listed on pg. 12, were detected in soils and groundwater at the site. Additionally, due to the presence of separate-phase hydrocarbons, matrix interferences, or other circumstances, the analytical method reporting limits or detection limits were elevated for many constituents. A comparison of the analytical results at these elevated detection limits with screening level industrial preliminary remediation goals (PRGs) (EPA Region 9 PRGs) indicates that many of these data are not useable for risk assessment purposes. As such, the list of contaminants for investigation in the RI must to be expanded to include chlorinated volatile organic compounds, semi-volatile organic compounds (base/neutral and acid extractable), and additional metals, copper and zinc.
19. Section 3.1. This section should include separate-phase hydrocarbons (SPH) as a constituent or acknowledge SPH as a specific concern because of its mobility, high concentration, difficulty of control, and migration potential.
20. Formatting Suggestions:

- a) Section 3.1 should be moved to a new section 3.3.4 (see #b below).
- b) New Section 3.3. Insert this new section before the existing Section 3.3 and call the new section "Locality of the Facility". Include new Subsections 3.3.1 as "Summary of Contaminant Migration Pathways", 3.3.2 as "Known and Potential Extent of Contamination", 3.3.3 as "Preliminary Locality of the Facility" (with an outline shown on an appropriate figure, which can be modified as further RI data becomes available), and 3.3.4 as "Contaminants of Interest".
- c) New Section 3.4. Insert this new section after new Section 3.3 and name it, "Land Use". Include new Subsections 3.4.1 as "Current and Historical Land Use" and 3.4.2 as "Reasonably Likely Future Use".
- d) Existing Section 3.3.1 and 3.4.1. Place these current land use sections in the new Section 3.4 "Land Use".
- e) New Section 3.5. Add a new Section 3.5 named, "Beneficial Water Use" and include new Subsections 3.5.1 as "Current and Historical Water Use" (Groundwater and Surface Water), and 3.5.2 as "Reasonably Likely Future Beneficial Water Use" (Groundwater and Surface Water).
- f) Existing Section 3.3.2 and 3.4.2. Place all of the water use text in the new Section 3.5 "Beneficial Water Use".

The suggested formatting changes provide for the evaluation of the locality of the facility, land use, and beneficial water use consistent with OAR 340-122 requirements. At a minimum, the information that would be included in these text recommendations should be provided in this work plan.

- 21. Section 3.3.1. The "Current and Historical Land Use" section should include a discussion of the GS Roofing facility. In addition, the first paragraph should clarify that there are residential properties immediately southwest of the facility across Highway 30.
- 22. Section 3.3.2. The "Current and Historical Water Use" section should include results of a well survey, summary of potential water uses based on background water quality and quantity, and any regional use information that may have a bearing on water use in the locality of the facility. This would include development of nonpotable water supply for park or business irrigation, encroaching residential development or similar.
- 23. Section 3.3.2. This section does not appear to actually reach a conclusion regarding what the water uses are at and in the locality of the facility. While mentioning fishing as a use, it fails to mention any ecological uses of the river. This section

should state clearly those beneficial uses of water that will be considered when developing the conceptual site model and those that will not be considered. In addition, a defensible explanation must also be provided for inclusion or exclusion of a particular use.

24. Section 3.4.1, page 21. There have been several former heavy industrial use sites in the Portland area that have been undergoing redevelopment into residential and commercial areas (ex. Hoyt Street Railyard, Schnitzer/Moody Avenue sites). As such, the first sentence should be revised to state that heavy industrial use is the most likely foreseeable use, rather than it the only future foreseeable use.
25. Section 3.4.1. The discussion of future land use is inadequate as it makes no reference to specific information (such as land use plans) to support claims for future use. Again, the presence of residences in close proximity to the facility is not mentioned.
26. The new "Reasonably Likely Future Use" section should include a map showing comprehensive plan land use designations (including the nearby residential and commercial properties) and overlays. Explain the overlays in reference to the site and provide documentation to support reasonably likely future land use for properties outside the ownership boundaries of the facility, but within the locality of the facility. This could be some type of contact documentation providing information about future land use for "off-site" properties by land owners.
27. Section 3.4.2. The "Reasonably Likely Future Beneficial Water Use" section should take all of the information gathered and conclude what groundwater and surface water uses are reasonably likely in the locality of the facility.
28. Beneficial Water Use Section. This section should include an evaluation of whether there is groundwater use nearby that could affect contaminant migration or the effectiveness of any future remedial actions.
29. Beneficial Water Use Section. This section needs to consider the support of aquatic habitat as a current and reasonably likely future beneficial use of groundwater and surface water.
30. Figure 3-2. Provide a reference for this figure and include the approximate date the figure represents. Also, this figure is not discussed or referenced in the text.
31. Section 3.5, page 21, and Figure 3-4. The CSM discounts the potential for off-site transport of contaminants. The potential for fugitive dust emissions to reach off-site receptors, such as the residences in close proximity to the facility, should be included in the CSM. The conceptual site model CSM appears to prematurely exclude the possibility of terrestrial ecological receptors contacting contaminated soils or waters

emerging from seeps. Since numerous terrestrial species (e.g., nutria, deer, small mammals) have been observed on immediately adjacent properties, their presence on the Willbridge facility cannot be discounted at this point and this pathway should be included in the CSM. Until the beneficial uses of water have been fully discussed, it may be premature to exclude a groundwater to receptor pathway from the model.

32. Figure 3-4, Conceptual Site Model.

- a) The "leaks/spills" box coming from the underground fuel storage/piping primary source box should also be connected to the infiltration box (secondary release mechanism) and/or the groundwater box (pathway).
- b) Receptors should also include trespassers and recreational river users.
- c) As volatile organic compounds are present in soils and groundwater, inhalation should be included as an exposure route for trench workers for soils and groundwater.
- d) SPH in the subsurface should be identified as a secondary source of contaminants to groundwater and surface water/sediments.
- e) Utility corridors should be identified as a migration pathway.

33. Section 4.2, page 24. A discussion of the available data should be provided to include sources of the data, media sampled, constituents analyzed, QA/QC validation summary, and usability of the data for remedial investigation and risk assessment purposes. If the existing data cannot be shown to be adequate for the remedial investigation and risk assessment, then additional data collection is necessary and should be identified in this work plan.

34. Section 4.2, page 24. The text should refer to the model in singular, otherwise provide an explanation for having multiple models to characterize a site.

35. Section 4.2, page 24. The description of the model should be updated to reflect the additional components provided in Comment #32. In addition, the second bullet should be revised to include groundwater as a transport mechanism for both SPH and dissolved phase contaminants. The third bullet should include the potential for erosion and overland transport of soils to sediments.

36. Section 4.2, page 25. As per the Consent Order, the determination of contaminant nature and extent is not limited to the site boundaries, except as defined for sediment and surface water. Therefore, the first project objective must include determining the extent of groundwater contamination from releases at the site, both within the property boundaries and off-site.

37. Section 4.2, page 25. The project objectives should include identification of contaminant pathways and receptors, determining the locality of the facility, identification of hot spots per OAR 340-122-080(7), and determining if the site poses



an unacceptable risk to human health and the environment.

38. Section 4.3. The list of identified data gaps should be expanded to include incomplete characterization of surface soils at the GATX facility (see Comments #3, 18, 33); undefined extent of off-site migration of contaminated groundwater; insufficient evaluation of the nature and extent of contaminants of potential concern, particularly chlorinated volatile and semi-volatile organic compounds, in soils, groundwater, and sediments; inadequate assessment of the potential impacts to terrestrial organisms; and the lack of detailed ecological information regarding the terrestrial and aquatic components of the site and adjacent river.
39. Tables 4-1 and 4-2. The tables need to be revised to include additional contaminants (COPCs) and appropriately revised analytical methods. Table 4-1 should also include the following:
  - a) chlorinated volatile organic compounds for soils, subsurface soils, and groundwater
  - b) semi-volatile organics for soils, subsurface soils, groundwater, and sediments
  - c) arsenic, lead, and chromium for soils, subsurface soils, groundwater, and sediments
  - d) copper and zinc for groundwater, surface water, and sediments
  - e) organochlorine pesticides for sediments.
40. NEW Section 4.4. Insert a new Section 4.4 as "Design of Data Collection Program", that provides an overview of the investigative program based on discussions in Sections 4.2 and 4.3. The details of the program, then, logically follow in the next Section 5.0.
41. Section 5.0. This section should address how hot spots will be identified and delineated at the site. Additionally, this section should describe how the locality of the facility will be determined, i.e. off-site migration of contaminants.
42. Section 5.0. There appears to be no provision in the work plan for characterizing background concentrations. Will background, therefore, be excluded as a basis for screening contaminants?
43. Section 5.1, page 27. The rationale for the number, spacing, and locations of the samples should be provided.
44. Section 5.1, page 27, first paragraph. Until it can be demonstrated that the existing data from the GATX facility are usable for remedial investigation and risk assessment purposes and that the recent spill has been addressed, DEQ does not agree with the statement that sufficient data exist at this site to make additional surface soil sampling unnecessary. Additional surface and subsurface soil sampling

should be performed as part of this remedial investigation at the GATX facility.

45. Section 5.1, page 27, second paragraph. The surface soil sampling scheme should be more definitive about which samples will or will not be taken. There is no basis to preclude sampling in areas that are accessible but covered (e.g. parking lots or streets). The samples can be moved to more accessible locations versus eliminating samples.
46. Figure 5-2.
  - a) The sample location map should be superimposed on a map showing where the releases at the facility have occurred.
  - b) The figure shows 16 boring locations (11 geoprobe and 5 monitoring wells) whereas the text identifies 14 locations (page 28). The text also describes 9 borings to be collected along the Willamette River shoreline, however, the figure only shows 7 of the boring locations.
  - c) The text on page 32 identifies 13 stations for surface water and sediment sample collection, however, the figure only shows 12 of these locations.
  - d) In the legend, the "Proposed River Sediment Sample Location" should read "Proposed River Surface Water/Sediment Sample Location". However, if these locations are expected to differ, then separate symbols for sediment and surface water samples should be provided.
  - e) All sample locations should be identified by number in this figure.
  - f) The location of the storm sewer outfall and Saltzman Creek should be indicated on the figure.
47. Section 5.1.1. The constituents and associated analytical methods should be revised to include metals (RCRA 8), chlorinated volatile organic and semi-volatile organic compounds.
48. Section 5.2, page 28, first paragraph. Regarding the use of existing data at the GATX facility, the same comment as in Comment #44 applies here.
49. Section 5.2, page 28. This section implies that no further work is necessary to characterize SPH. This section, or another location in the work plan, should describe available data that characterizes SPH, including where SPH is located (maps showing all SPH areas should be provided), a discussion of variability in presence and measured thickness of SPH seasonally and over time, and the significance of recent spills on presence of SPH given the volumes of these spills.
50. Section 5.2.1. Provide the rationale for the number, spacing, and locations of the samples to be collected.
51. Section 5.2.3. The constituents and associated analytical methods should be revised to include metals (RCRA 8), chlorinated volatile organic and semi-volatile organic

compounds.

52. Section 5.3, page 30. An additional data gap is the need to determine if off-site migration of contaminants in groundwater has occurred to adjacent properties (i.e. GS Roofing and McCall Oil/Great Western Chemical). The current groundwater monitoring network does not appear to be adequately determining where off-site migration is occurring.
53. Section 5.3.2.1, page 31. There is insufficient water level, and probably water quality, information on the adjacent Chevron Asphalt property to define groundwater flow direction and gradient. Definition of the locality of the facility will likely show that McCall Oil/Great Western Chemical sites are, in fact, downgradient of the Willbridge facilities. This is a data gap not addressed in this work plan that may require installation of a well, or inclusion of other existing wells in the monitoring program to provide water level information.
54. Section 5.3.3, page 32. The constituents and associated analytical methods should be revised to include copper and zinc, organochlorine pesticides, chlorinated volatile organic and semi-volatile organic compounds.
55. Section 5.4.1, page 32. How will the mixing zone be defined or determined for this site?
56. Section 5.4.2, page 32. Provide the rationale for the number, spacing, and locations of the samples to be collected. Why are there no sediment sample locations between the upstream end of the Tosco property and the two upstream sediment sample locations? One of the upstream locations could be moved further upstream (and away from a fuel loading dock) to provide a better indication of upgradient concentrations.
57. Section 5.4.4, page 33. The constituents and associated analytical methods should be revised to include copper and zinc, organochlorine pesticides, and semi-volatile organic compounds.
58. Section 5.4.3, page 32. DEQ suggests that the outfall be sampled simultaneously with the samples collected from the bedding material to confirm that leakage into the storm sewer does not occur.
59. New Section 5.5. Add a new Section 5.5 "Hot Spot Identification" to evaluate the presence of hot spots of contamination in soil, groundwater, surface water, and sediments.
60. Section 6.1, page 34. This section should more clearly indicate that the following text of the work plan describes what will be covered in the RI Report (using the

proposed RI Report headings).

61. Section 6.2, page 34. Indicate that the results of a complete and comprehensive land and beneficial water use determination for this facility will be provided in this section of the RI Report.
62. Section 6.5.1, page 35. With respect to use of the new term, CPHC, in this section, see Comment #16.
63. Section 6.5.1, page 35. The Department prefers to use only U.S. EPA Region IX's Preliminary Remedial Goals (PRGs) tables for the purposes of screening contaminants in the human health risk evaluation. This section should indicate whether comparison will be made to industrial and/or residential PRGs.
64. Section 6.5.2, page 36. There needs to be clarification on why residents is bulleted as an "identified" exposure scenario, when the descriptor says no residents are expected to live on-site. The potential for exposure of adjacent residents needs to be addressed.
65. Section 6.5.2. Recreational river users should be added to the list of current exposure conditions. The discussion in this section should be consistent with the CSM presented in Figure 3-4 (see Comment #32).
66. Section 6.5.2 and 6.5.3. Based on the results of a beneficial water use determination, additional exposure scenarios may need to be developed to address exposure to contaminated groundwater.
67. Section 6.5.5. The trench worker scenario should include exposure to organic vapors by inhalation, since VOCs are present in the subsurface at the site.
68. Section 6.5.5.1, page 37. Define the use of the term "hot spots" in the last paragraph. It appears that the term used here is not consistent with hot spots as defined in OAR 340-122-115(31).
69. Section 6.6.1.2, page 42. In the first paragraph, clarify whether alternate RfDs will or will not be used.
70. Section 6.8, page 44. Clarify if a qualitative and/or quantitative uncertainty analysis will be performed.
71. Table 6-1. Why do the parameters BW and AT appear in both the numerator and denominator of this equation? Note that the "average" ED is actually the median ED and should be labeled as such.

72. Table 6-2. Why is the average AF given as  $0.6 \text{ mg/cm}^2$  when the U.S. EPA default value is  $0.2 \text{ mg/cm}^2$ ? There needs to be a discussion in the text of how ABS values will be determined.
73. Table 6-3. Why do the parameters BW and AT appear in both the numerator and denominator of this equation? Note that the "average" ED is actually the median ED and should be labeled as such. The value for the PEF appears to be incorrect. For IR, a CTE value other than  $20 \text{ m}^3/\text{day}$  should be selected.
74. Table 6-4. Why do the parameters BW and AT appear in both the numerator and denominator of this equation? The statement "best professional judgment" is not sufficient to support selection of these EF values. There should be a discussion in the text of why these particular values were selected and this discussion should reference any supporting documents, studies, site-specific observations, etc. The RME value for ED should be 7 years; a CTE value of 2.5 years for ED is acceptable.
75. Table 6-5. Why is the average AF given as  $0.6 \text{ mg/cm}^2$  when the U.S. EPA default value is  $0.2 \text{ mg/cm}^2$ ? There needs to be a discussion in the text of how ABS values will be determined. The statement "best professional judgment" is not sufficient to support selection of these EF values. There should be a discussion in the text of why these particular values were selected and this discussion should reference any supporting documents, studies, site-specific observations, etc. The RME value for ED should be 7 years; a CTE value of 2.5 years for ED is acceptable.
76. Table 6-6. The statement "best professional judgment" is not sufficient to support selection of these EV, EF and  $t_{\text{exam}}$  values. There should be a discussion in the text of why these particular values were selected and this discussion should reference any supporting documents, studies, site-specific observations, etc. The RME value for ED should be 7 years; a CTE value of 2.5 years for ED is acceptable.
77. Table 6-7. The statement "best professional judgment" is not sufficient to support selection of these EF values. There should be a discussion in the text of why these particular values were selected. A CTE value, other than  $20 \text{ m}^3/\text{day}$ , should be selected for IR.
78. Section 7.3.2, page 48. Despite a perceived, but as yet undocumented, "lack of wildlife habitat", the presence of terrestrial receptors and potential terrestrial exposure routes should be investigated.
79. Section 7.3.2, page 48. The "Site Survey" activity should be followed by the identification of ecological receptors (now Section 7.3.3.(C)) and then by an identification of candidate assessment endpoints (currently missing). The screening activity now described in Section 7.3.3.(B) cannot take place until these endpoints have been defined. Note that discussions with the Department are likely to be

required in order to accomplish definition of these endpoints.

80. Section 7.3.3.(B), page 48. Delete the third and fourth paragraphs as these issues are not relevant to ecological screening as contemplated in Department guidance.
81. Section 7.3.3.(B), page 49. In the first full paragraph on this page, note that the Level II (Screening) guidance has now been finalized and includes a slightly different toxicity screening procedure. Reference is now made to the Department's guidance on screening benchmark values (SBVs). Copies of the final Level II and draft SBV guidance will be provided.
82. Section 7.3.3.(B), page 49. In the second full paragraph on this page, the statement "Because of the lack of terrestrial habitat..." is premature. Any statements as to the presence or absence of such habitat should await completion of the site survey portion of the Level II activity.
83. Section 7.3.3.(B), page 49. In the third full paragraph on this page, note that changes to the final Level II guidance have replaced these  $K_{ow}$  criteria with a list of priority bioaccumulating contaminants that must be carried through risk analysis regardless of other factors.
84. Section 7.3.3.(C), page 50. In the first paragraph, the statement "... significant terrestrial receptors are not expected to occur." is premature. (See Comment #82).
85. Section 7.3.3.(F), page 50. Again, the statement "... apparent lack of terrestrial habitat and terrestrial receptors in the vicinity of the site..." is premature. (See Comments #82 and #84).
86. Section 7.3.4, page 51. In the third paragraph, delete the sentence beginning with "Because of the conservative nature ...". A Level II assessment is intended to be conservative.
87. Appendix A, Section A.3.1.1. Explain how surface soil samples will be collected at depth based on thickness of the native soil present. Identify which samples are expected to be collected in areas with the native material vs. the areas with fill.
88. Appendix A, Section A.3.1.2. The text identifies 14 boring locations but the referenced Figure 5.2 shows 16 locations. (See Comment #46(b)).
89. Appendix A, Section A.3.3.1 and A.5.8.2. The text identifies 13 sampling locations, although the referenced Figure 5.2 only shows 12 locations. (See Comment #46(c)).

90. Appendix A, Section A.3.3.1. Provide additional details on how the rating curves will be used.
91. Appendix A, page A-13. Section A.5.3 describing borehole drilling and sampling appears to be missing.
92. Appendix A, Section A.5.6.2. What is the implication if SPH is measured in a well? Will the well be sampled? Will the thickness of SPH be measured and recorded?
93. Appendix A, Section A.5.6.2. Under item 9 of this section, is the intent that parameter readings will be within 10 % of each other? If so, the text is unclear.
94. Appendix A, Section A.5.8.3. The equipment list includes a dredge sampler but it is unclear from this section or later sections how the sampler will be used.
95. Appendix B, Section 1.4. Delete the first sentence of this section and reference to the consent order in the second sentence. The DEQ Consent Order does not specifically identify contaminants of concern at the site, rather it requires the identification of all hazardous substances at the site that may have been released into the environment.
96. Appendix B, Section 1.4, The list of contaminants needs to be expanded. See Comment #18.
97. Appendix B, Section 4.1. For investigation-derived waste (IDW) generated at the site, a hazardous waste determination must be conducted. Additional details should be provided on the how the IDW will be characterized and managed accordingly.
98. Appendix B, Section 5.1.1. The references to Tables 6-1 and 6-2 are incorrect.
99. Appendix B, Section 5.1.4. The reference to Section 6.1.1 is incorrect.
100. Appendix B, Table B-A-1. What is the purpose of this table?
101. Appendix D, Table 1. Page 82 of 144 needs to be replaced.
102. Appendix D, Table 1. The table should distinguish between wells where an SPH recovery was attempted and where it was not.

## ATTACHMENT A

### WILLBRIDGE BULK FUELS FACILITIES PROJECT Incident Referrals

The following is a listing and description of incidences that have been referred to the Site Response Program for incorporation into the remedial investigation and feasibility study for the Willbridge Bulk Fuels Facilities, which includes the GATX, Chevron, and Unocal (now TOSCO) facilities. Referrals have been made the Site Assessment Program, Spills Program, and the Underground Storage Tank (UST) Cleanup Program. These referrals should be addressed by the Remedial Investigation to be conducted at the Willbridge Bulk Fuels Area.

#### 1. **GS Roofing:**

- a) UST cleanup site, where releases of BTEX compounds to groundwater have occurred.
- b) Facility's upgradient monitoring well (MW-1), which is downgradient from the GATX site (formerly Shell Oil), had elevated benzene concentrations during groundwater monitoring events on 8/96, 11/96, and 3/97.
- c) There is a need to determine if contaminated groundwater from the GATX site is migrating off-site onto the GS Roofing facility.

#### 2. **McCall Oil/Great Western Chemical Company:**

- a) An expanded Preliminary Assessment (XPA) and quarterly groundwater monitoring were conducted to evaluate releases of petroleum hydrocarbons, VOCs, and metals to soils and groundwater.
- b) The results of the XPA and groundwater monitoring showed relatively little impact to soils and groundwater, except for monitoring well, EX-4, which is up/side-gradient from the Unocal facility. In a March 1995 sampling event, diesel at 2140 µg/L and a heavy oil petroleum compound at 3840 µg/L were found in EX-4.
- c) Site Assessment has proposed an NFA for this site, however, final close-out of the site is pending a determination of whether or not there is off-site contaminant migration from the Unocal facility.

#### 3. **Chevron UST Decommissioning: (UST #26-94-072)**

- a) A 6,000 gallon UST was used for waste motor oil. During its decommissioning in April 1994, a release from the tank was discovered.



- b) Approximately 20 cubic yards of contaminated soils were removed, however, confirmation soil sampling showed that TPH contamination, above the UST cleanup levels, remained.
  - c) No further sampling or excavation was conducted. Rather the UST Cleanup program referred the incident to the Site Response Program for incorporation into the Willbridge RI/FS.
4. **Unocal UST Decommissioning: (UST #26-94-6015)**
- a) A 10,000 gallon UST was used for heating oil. During its decommissioning in February 1994, a release from the tank was discovered.
  - b) TPH (diesel) was found in soil samples collected from the UST area at concentrations exceeding the UST cleanup levels. Analytical results for two samples showed diesel concentrations at 1500 and 3100 mg/kg.
  - c) No further sampling or excavation was conducted. Rather the UST Cleanup program referred the incident to the Site Response Program for incorporation into the Willbridge RI/FS.
5. **Unocal UST Decommissioning: (UST #26-97-0577)**
- a) New site (8/14/97) with little information available other than it was a gasoline/diesel UST.
6. **GATX Spill: (OERS #96-2921)**
- a) A spill of jet fuel occurred on 10/18/96. The spill occurred from a filter vessel within the south tank farm between Tanks 2 and 52.
  - b) Initially, it was estimated that 500 gallons had been released, however, during cleanup efforts, approximately 2,600 gallons had been recovered.
  - c) The Spill Program referred the incident to the Site Response Program in March 1997.
7. **Unocal Spill: (OERS #97-0545)**
- a) A 11,000 gallon gasoline spill occurred on 2/22/97 as the result of overfilling Tank 3411. Only 1,600 gallons of product were recovered.
  - b) The Spill Program referred the incident to the Site Response Program in July 1997.
8. **Unocal Spill: (OERS #95-261)**

- a) A spill of 5,000 gallons of an oil additive occurred on 11/3/95 as the result of a broken valve near Tank 2783. The oil additive is highly viscous, so the release was mainly to the surface soils.
- b) Approximately 2,000 gallons of an oil/water mixture were recovered.
- c) Approximately 140 drums of contaminated soils were excavated from the area. Confirmation sampling showed that the residual contaminants were at acceptable levels (UST cleanup levels).
- d) The Spill Program determined that no further actions were required for the soils, however, the incident was referred to the Site Response Program to evaluate the potential impacts to groundwater as part of the RI/FS for the site.

**DEQ COMMENTS ON 9/8/97 DRAFT  
REMEDIAL INVESTIGATION WORK PLAN**

**GENERAL COMMENTS**

1. Since the issuance of the Consent Order in 1994, DEQ has been providing oversight of the cleanup activities conducted at the site. In the process of reviewing and evaluating the interim action work plans and groundwater monitoring reports, DEQ had provided comments and identified several informational needs and data gaps that are necessary for the adequate characterization of site and evaluating performance of the interim action activities. Most of these previous comments had been addressed, however, some were deferred to the remedial investigation (RI) phase of work. The following is a listing of those deferred items which do not appear to be addressed in this work plan. DEQ still regards these informational needs and data gaps as important items that should be addressed in this RI Work Plan.

The original comments can be found in DEQ's letter of February 28, 1995, addressed to Ross Rieke and Scott McKinley of CH2M Hill regarding "DEQ Comments on Draft Interim Action Plan for Willbridge Facilities", and the subsequent response letter dated April 11, 1995, to Jill Kiernan at DEQ from Ross Rieke regarding, "Response to DEQ Comments, Willbridge RI/FS Interim Action Work Plan".

- major effort  
40 hrs*
- a) An objective of the remedial investigation is to identify contaminant migration pathways. While two underground storm sewer lines at the site have already been identified as migration pathways, other buried utilities could be acting as contaminant migration pathways. Accordingly, the RI Work Plan should address how releases from other underground utilities will be identified and evaluated. Additionally, a map showing the locations and elevation profiles of all underground utilities along the perimeter of the site to include Front Avenue, Doane Avenue, and west of the site in the area of the railroad corridor and St. Helens Road should be provided.

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facility  
will be  
attended*

- yes  
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- b) The inclusion of gasoline additives, such as 1,2-dibromoethane and 1,2-dichloroethane, as contaminants of concern at the site should be evaluated.

*Ask Jill  
about these*

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borings  
shaper  
on findings  
now*
- c) Investigations should be conducted to evaluate the occurrence of free-phase hydrocarbon in the areas north and east of the GATX facility and on the south end of the TOSCO facility.

- d) The RI Work Plan should discuss, in general, the performance of tank and piping inspections and integrity testing in accordance with API standards and tank and piping containment features at the three facilities. — *Post Practice Interview*

2. In a letter addressed to Pacific Environmental Group and dated September 4, 1997, providing DEQ comments on the Interim Action Work Plan, DEQ requested that additional characterization of the contaminant extent and migration pathways in the

transducer  
and pump  
test

area of the Holbrook trench and the old, abandoned 27-inch storm drain be conducted during the remedial investigation. The RI Work Plan should include this additional characterization.

We are  
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ap this short

3. DEQ's Site Response Program has been providing oversight of the cleanup activities conducted at the site related to interim remedial actions, groundwater monitoring, and remedial investigations. Other DEQ programs that have been involved in assessment and cleanup activities at the site include the Site Assessment Program, Underground Storage Tank Program, and Spill Response Program. Since the Site Response Program has assumed the lead role in coordination of the cleanup efforts, there have been several incidences that have been referred or transferred to Site Response from these other programs for incorporation into the site-wide remedial investigation.

The following is a listing of incidences referred to Site Response that need to be addressed in this RI Work Plan. Details of these incidences are provided in Attachment A. The work plan should address these incidences with a discussion summarizing the incident, available sampling results, cleanup actions taken, and recommendations for further actions, if needed. Further actions may include additional sampling and/or remediation.

Past  
Practices  
Interview

- 4a) **GS Roofing:** Possible off-site migration of contaminants in groundwater from the GATX facility onto the GS Roofing site. Note that DEQ had previously requested that this issue be addressed by letter dated November 19, 1996, addressed to Mr. Irv Jenkins at Shell Oil Company.
- 4b) **McCall Oil/Great Western Chemical:** Possible off-site migration of contaminants in groundwater from the TOSCO facility on the McCall Oil/Great Western Chemical site.
- (c) **Chevron UST Decommissioning** (UST #26-94-072).
- (d) **Unocal UST Decommissioning** (UST #26-94-6015).
- (e) **Unocal UST Decommissioning** (UST #26-97-0577).
- (f) **GATX Spill** (OERS #26-2921) Jet fuel spill occurring on 10/18/96 between Tanks 2 and 52.
- (g) **Unocal Spill** (OERS #97-0545) Gasoline spill on 2/22/97 at Tank 3411.
- (h) **Unocal Spill** (OERS #95-261) Oil additive spill on 11/3/95 near Tank 2783.

Past  
Practices

#### SPECIFIC COMMENTS

AR 400?

*Past  
Practices  
Interviews*

4. Sections 2.1, 2.2. These sections should be included in the later section presenting the conceptual site model (Sec 3.0). Section 2.0 should be renamed "Facility Description", and focus on describing the historical and current operations at all of the separate properties as currently structured.

5. Section 2.1. It should be noted in this section that the "Tualatin Mountains" are actually Forrest Park, a sizable area of significant wildlife habitat and the largest urban park in the country.

6. Section 2.2.2. An effort was made to list plant species by scientific name and the same should be done for possible animal species. The "waterfowl" sighted should be specified as these are generally a concern of the Migratory Bird Treaty Act.

7. Figure 2-1. The boundaries of the Willbridge facility should be clearly delineated on this figure.

8. Figure 2-2. The boundaries of the Willbridge facility should be clearly delineated on this figure so as to distinguish this site from other cleanup sites in the area. In addition, the GATX, Chevron, and TOSCO sites should be differentiated on this base map such that the five figures that follow it can be keyed in to the base map.

*NE  
we  
are  
showing  
property  
line on the  
base map*

9. Section 2.3.1. This section should include a discussion of the Chevron 6,000 gallon underground storage tank (UST). Table 2-2 and Figure 2-3 should also be revised to include this UST.

10. Figure 2-3. This figure should be revised to include the waste management and disposal areas at the site, including the tank bottom sludge disposal areas, oil/water separators and hydrocleaners, loading racks and areas, Tank 108, and the drum reconditioning area.

11. Section 2.3.2. This section should include a discussion of the GATX jet fuel spill on 10/18/96. Table 2-4 and Figure 2-4 should be revised to include this spill.

12. Figure 2-4. This figure should be revised to include the waste management and disposal areas at the site, including tank bottom sludge disposal areas, oil/water separators, Tanks 85 and 140, DDT storage area, and loading racks and areas.

13. Section 2.3.3. Update this section to include a discussion of the Unocal USTs and recent spills. Table 2-6 and Figure 2-7 should be revised to include these releases.

14. Figure 2-7. This figure should be revised to include the waste management and disposal areas at the site, including tank bottom sludge disposal areas, oil/water separators, Tanks 36 and 4223, and loading racks and areas.

15. Section 3.0. This section should be singular: Conceptual Site Model. There is usually only one "site model". This section should open with a discussion of what a

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stuff onto map.*

conceptual site model is and what it does: establish geologic/hydrogeologic conditions, identify contaminant migration pathways and receptors, aid in determining locality of the facility, and identification of data gaps.

are  
• rewrite  
conceptual  
site model,  
include in  
response  
document

16. Section 3.1, page 12. For the human health risk assessment, if a screening step is contemplated, it may be clearer to designate contaminants that haven't been screened as "Contaminants of Interest (COIs)", those that have been screened as "Contaminants of Potential Concern (COPCs)", and those that, following a baseline risk assessment, do not meet acceptable risk levels, as "Contaminants of Concern (COCs)".

17. Section 3.1, page 12. In the second paragraph, the text implies that COPCs were specified in the DEQ Consent Order. This is not the case, rather the Consent Order requires the identification of all site-related hazardous substances which may have been released into the environment.

18. Section 3.1. DEQ has conducted a review of past investigations conducted at the site, including the analytical data. Several constituents, other than those listed on pg. 12, were detected in soils and groundwater at the site. Additionally, due to the presence of separate-phase hydrocarbons, matrix interferences, or other circumstances, the analytical method report limits or detection limits were elevated for many constituents. A comparison of the analytical results at these elevated detection limits with screening level industrial preliminary remediation goals (PRGs) (EPA Region 9 PRGs) indicates that many of these data are not useable for risk assessment purposes. As such, the list of contaminants for investigation in the RI must to be expanded to include chlorinated volatile organic compounds, semi-volatile organic compounds (base/neutral and acid extractable), and additional metals, copper and zinc.

Past practices  
will dictate  
looking for  
these; maybe  
one sample  
can the shop  
means.

19. Section 3.1. This section should include separate-phase hydrocarbons (SPH) as a constituent or acknowledge SPH as a specific concern because of its mobility, high concentration, difficulty of control, and migration potential.

#### 20. Formatting Suggestions:

- a) Section 3.1 should be moved to a new section 3.3.4 (see #b below).
- b) New Section 3.3. Insert this new section before the existing Section 3.3 and call the new section "Locality of the Facility". Include new Subsections 3.3.1 as "Summary of Contaminant Migration Pathways", 3.3.2 as "Known and Potential Extent of Contamination", 3.3.3 as "Preliminary Locality of the Facility" (with an outline shown on an appropriate figure, which can be modified as further RI data becomes available), and 3.3.4 as "Contaminants of Interest".
- c) New Section 3.4. Insert this new section after new Section 3.3 and name it, "Land Use". Include new Subsections 3.4.1 as "Current and Historical Land Use" and 3.4.2 as "Reasonably Likely Future Use".

- ✓ (d) Existing Section 3.3.1 and 3.4.1. Place these current land use sections in the new Section 3.4 "Land Use".
- ✓ (e) New Section 3.5. Add a new Section 3.5 named, "Beneficial Water Use" and include new Subsections 3.5.1 as "Current and Historical Water Use" (Groundwater and Surface Water), and 3.5.2 as "Reasonably Likely Future Beneficial Water Use" (Groundwater and Surface Water).
- ✓ (f) Existing Section 3.3.2 and 3.4.2. Place all of the water use text in the new Section 3.5 "Beneficial Water Use".

The suggested formatting changes provide for the evaluation of the locality of the facility, land use, and beneficial water use consistent with OAR 340-122 requirements. At a minimum, the information that would be included in these text recommendations should be provided in this work plan.

- ✓ (21) Section 3.3.1. The "Current and Historical Land Use" section should include a discussion of the GS Roofing facility. In addition, the first paragraph should clarify that there are residential properties immediately southwest of the facility across Highway 30.
- ✓ (22) Section 3.3.2. The "Current and Historical Water Use" section should include results of a well survey, summary of potential water uses based on background water quality and quantity, and any regional use information that may have a bearing on water use in the locality of the facility. This would include development of nonpotable water supply for park or business irrigation, encroaching residential development or similar.
- ✓ (23) Section 3.3.2. This section does not appear to actually reach a conclusion regarding what the water uses are at and in the locality of the facility. While mentioning fishing as a use, it fails to mention any ecological uses of the river. This section should state clearly those beneficial uses of water that will be considered when developing the conceptual site model and those that will not be considered. In addition, a defensible explanation must also be provided for inclusion or exclusion of a particular use.
- ✓ (24) Section 3.4.1, page 21. There have been several former heavy industrial use sites in the Portland area that have been undergoing redevelopment into residential and commercial areas (ex. Hoyt Street Rail yard, Schnitzer/Moody Avenue sites). As such, the first sentence should be revised to state that that heavy industrial use is the most likely foreseeable use, rather than it the only future foreseeable use.
- ✓ (25) Section 3.4.1. The discussion of future land use is inadequate as it makes no reference to specific information (such as land use plans) to support claims for future use. Again, the presence of residences in close proximity to the facility is not mentioned.
- ✓ (26) The new "Reasonably Likely Future Use" section should include a map showing comprehensive plan land use designations (including the nearby residential and

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commercial properties) and overlays. Explain the overlays in reference to the site and provide documentation to support reasonably likely future land use for properties outside the ownership boundaries of the facility, but within the locality of the facility. This could be some type of contact documentation providing information about future land use for "off-site" properties by land owners.

add  
doc.

27. Section 3.4.2. The "Reasonably Likely Future Beneficial Water Use" section should take all of the information gathered and conclude what groundwater and surface water uses are reasonably likely in the locality of the facility.
28. Beneficial Water Use Section. This section should include an evaluation of whether there is groundwater use nearby that could affect contaminant migration or the effectiveness of any future remedial actions.
29. Beneficial Water Use. This section needs to consider the support of aquatic habitat as a current and reasonably likely future beneficial use of groundwater and surface water.
30. Figure 3-2. Provide a reference for this figure and include the approximate date the figure represents. Also, this figure is not discussed or referenced in the text.
31. Section 3.5, page 21, and Figure 3-4. The CSM discounts the potential for off-site transport of contaminants. The potential for fugitive dust emissions to reach off-site receptors, such as the residences in close proximity to the facility, should be included in the CSM. The conceptual site model CSM appears to prematurely exclude the possibility of terrestrial ecological receptors contacting contaminated soils or waters emerging from seeps. Since numerous terrestrial species (e.g., nutria, deer, small mammals) have been observed on immediately adjacent properties, their presence on the Willbridge facility cannot be discounted at this point and this pathway should be included in the CSM. Until the beneficial uses of water have been fully discussed, it may be premature to exclude a groundwater to receptor pathway from the model.

have  
to  
modify

32. Figure 3-4, Conceptual Site Model.
- a) The "leaks/spills" box coming from the underground fuel storage/piping primary source box should also be connected to the infiltration box (secondary release mechanism) and/or the groundwater box (pathway).
  - b) Receptors should also include trespassers and recreational river users.
  - c) As volatile organic compounds are present in soils and groundwater, inhalation should be included as an exposure route for trench workers for soils and groundwater.
  - d) SPH in the subsurface should be identified as a secondary source of contaminants to groundwater and surface water/sediments.
  - e) Utility corridors should be identified as a migration pathway.
33. Section 4.2, page 24. A discussion of the available data should be provided to include sources of the data, media sampled, constituents analyzed, QA/QC validation



summary, and usability of the data for remedial investigation and risk assessment purposes. If the existing data cannot be shown to be adequate for the remedial investigation and risk assessment, then additional data collection is necessary and should be identified in this work plan.

34. Section 4.2, page 24. The text should refer to the model in singular, otherwise provide an explanation for having multiple models to characterize a site.
35. Section 4.2, page 24. The description of the model should be updated to reflect the additional components provided in Comment #32. In addition, the second bullet should be revised to include groundwater as a transport mechanism for both SPH and dissolved phase contaminants. The third bullet should include the potential for erosion and overland transport of soils to sediments.

determine  
the locality  
of the  
facility

36. Section 4.2, page 25. As per the Consent Order, the determination of contaminant nature and extent is not limited to the site boundaries, except as defined for sediment and surface water. Therefore, the first project objective must include determining the extent of groundwater contamination from releases at the site, both within the property boundaries and off-site.
37. Section 4.2, page 25. The project objectives should include identification of contaminant pathways and receptors, determining the locality of the facility, identification of hot spots per OAR 340-122-080(7), and determining if the site poses an unacceptable risk to human health and the environment.

Part  
produces

38. Section 4.3. The list of identified data gaps should be expanded to include incomplete characterization of surface soils at the GATX facility (see Comments #3, 18, 33); undefined extent of off-site migration of contaminated groundwater; insufficient evaluation of the nature and extent of contaminants of potential concern, particularly chlorinated volatile and semi-volatile organic compounds, in soils, groundwater, and sediments; inadequate assessment of the potential impacts to terrestrial organisms; and the lack of detailed ecological information regarding the terrestrial and aquatic components of the site and adjacent river.

C.O.I.s

39. Tables 4-1 and 4-2. The tables need to be revised to include additional contaminants (COPCs) and appropriately revised analytical methods. Table 4-1 should also include the following:
- a) chlorinated volatile organic compounds for soils, subsurface soils, and groundwater
  - b) semi-volatile organics for soils, subsurface soils, groundwater, and sediment
  - c) arsenic, lead, and chromium for soils, subsurface soils, groundwater, and sediment
  - d) copper and zinc for groundwater, surface water, and sediment
  - e) organochlorine pesticides for sediments.

lets look  
@ background  
metals

40. NEW Section 4.4. Insert a new Section 4.4 as "Design of Data Collection Program", that provides an overview of the investigative program based on discussions in Sections 4.2 and 4.3. The details of the program, then, logically follow in the next Section 5.0.

41. Section 5.0. This section should address how hot spots will be identified and delineated at the site. Additionally, this section should describe how the locality of the facility will be determined, i.e. off-site migration of contaminants.

42. Section 5.0. There appears to be no provision in the work plan for characterizing background concentrations. Will background, therefore, be excluded as a basis for screening contaminants?

43. Section 5.1, page 27. The rationale for the number, spacing, and locations of the samples should be provided.

44. Section 5.1, page 27, first paragraph. Until it can be demonstrated that the existing data from the GATX facility are usable for remedial investigation and risk assessment purposes and that the recent spill has been addressed, DEQ does not agree with the statement that sufficient data exist at this site to make additional surface soil sampling unnecessary. Additional surface and subsurface soil sampling should be performed as part of this remedial investigation at the GATX facility.

*we are sampling* →

45. Section 5.1, page 27, second paragraph. The surface soil sampling scheme should be more definitive about which samples will or will not be taken. There is no basis to preclude sampling in areas that are accessible but covered (e.g. parking lots or streets). The samples can be moved to more accessible locations versus eliminating samples.

→

46. Figure 5-2.

- a) The sample location map should be superimposed on a map showing where the releases at the facility have occurred.
- b) The figure shows 16 boring locations (11 geoprobe and 5 monitoring wells) whereas the text identifies 14 locations (page 28). The text also describes 9 borings to be collected along the Willamette River shoreline, however, the figure only shows 7 of the boring locations.
- c) The text on page 32 identifies 13 stations for surface water and sediment sample collection, however, the figure only shows 12 of these locations.
- d) In the legend, the "Proposed River Sediment Sample Location" should read "Proposed River Surface Water/Sediment Sample Location". However, if these locations are expected to differ, then separate symbols for sediment and surface water samples should be provided.
- e) All sample locations should be identified by number in this figure.
- f) The location of the storm sewer outfall and Saltzman Creek should be indicated on the figure.

*does this say how many samples* →

*Post.  
proposed*

47. Section 5.1.1. The constituents and associated analytical methods should be revised to include metals (RCRA 8), chlorinated volatile organic and semi-volatile organic compounds.
48. Section 5.2, page 28, first paragraph. Regarding the use of existing data at the GATX facility, the same comment as in Comment #44 applies here.
49. Section 5.2, page 28. This section implies that no further work is necessary to characterize SPH. This section, or another location in the work plan, should describe available data that characterizes SPH, including where SPH is located (maps showing all SPH areas should be provided), a discussion of variability in presence and measured thickness of SPH seasonally and over time, and the significance of recent spills on presence of SPH given the volumes of these spills.
50. Section 5.2.1. Provide the rationale for the number, spacing, and locations of the samples to be collected.
51. Section 5.2.3. The constituents and associated analytical methods should be revised to include metals (RCRA 8), chlorinated volatile organic and semi-volatile organic compounds.
52. Section 5.3, page 30. An additional data gap is the need to determine if off-site migration of contaminants in groundwater has occurred to adjacent properties (i.e. GS Roofing and McCall Oil/Great Western Chemical). The current groundwater monitoring network does not appear to be adequately determining where off-site migration is occurring.
53. Section 5.3.2.1, page 31. There is insufficient water level, and probably water quality, information on the adjacent Chevron Asphalt property to define groundwater flow direction and gradient. Definition of the locality of the facility will likely show that McCall Oil/Great Western Chemical sites are, in fact, downgradient of the Willbridge facilities. This is a data gap not addressed in this work plan that may require installation of a well, or inclusion of other existing wells in the monitoring program to provide water level information.
54. Section 5.3.3, page 32. The constituents and associated analytical methods should be revised to include copper and zinc, organochlorine pesticides, chlorinated volatile organic and semi-volatile organic compounds.
55. Section 5.4.1, page 32. How will the mixing zone be defined or determined for this site?
56. Section 5.4.2, page 32. Provide the rationale for the number, spacing, and locations of the samples to be collected. Why are there no sediment sample locations between the upstream end of the Tosco property and the two upstream sediment sample locations? One of the upstream locations could be moved further upstream (and away

*addressed  
w/ proposed  
borings*

*we are  
going  
to water  
levels*

State of Oregon  
Department of Environmental Quality

Memorandum

Date: February 1, 1995

To: Jill Kiernan  
From: Mike Kortenhof *MHK*  
Subject: Draft Interim Action Plan - Willbridge Facilities  
CH2MHill - November, 1994

I have reviewed the referenced report and found the information presented to provide an adequate overview of hydrocarbon recovery activities undertaken to date. Proposals to evaluate and expand existing hydrocarbon recovery systems appear technically sound but the scope could be expanded as described below. My comments and questions fall in to several categories: clarification of past work, site characterization and hydrocarbon recovery proposals. I focused my review on the free phase hydrocarbon recovery proposal and did not give close consideration to the dissolved phase groundwater data and the groundwater analytical program proposal; to do so would require a more comprehensive review of all available site characterization data.

Clarification of Past Work

- 1) Details of the tank and piping integrity program (page 2-23) should be provided. Tank bottoms and underground piping that have been inspected or replaced should be identified. A list of additional work to be performed should be provided along with a schedule for it's completion. *How do the terminals detect tank leaks; have some sources been identified???*
- 2) Are the groundwater elevations reflected in Figure 2-4 corrected for the presence of free phase hydrocarbon?
- 3) Historical hydrocarbon thickness and water level data should be tabulated and reported in conjunction with the proposed groundwater monitoring and reporting program. Likewise complete summaries of existing groundwater analyses should be provided to complete the data presented in Tables 2-3 and 2-4.

Site Characterization

- 1) Investigation of contamination due to gasoline additives (page 2-10) should include 1,2-dibromoethane as well as lead and 1,2-dichloroethane unless historical information is adequate to rule it out as a contaminant of concern. Consideration should be given to including analysis for all of these compounds in the groundwater monitoring program at this time in order to more efficiently develop the necessary site characterization information.

- 2) The free phase hydrocarbon data presented on Figure 2-5 appears to be well suited to contouring to produce a hydrocarbon thickness map. This would allow an initial estimate to be made of the total amount of hydrocarbon present in the subsurface. Such a map should be used to evaluate the areas where additional monitor wells may be needed to expand hydrocarbon recovery operations or complete delineation of the extent of contamination. No data is presented regarding the occurrence of free phase hydrocarbon north and east of the Shell facility or on the south end of the Unocal facility. This should be evaluated and additional investigation or monitoring performed as appropriate.
- 3) Consideration should be given to characterizing the type or mix of hydrocarbon products present in each well (gasoline, diesel, jet fuel, etc.). This information may help identify individual subsurface accumulations allowing more effective siting of hydrocarbon recovery efforts and would also provide information important to the eventual evaluation of possible soil and groundwater remedial alternatives. No!  
It's  
degraded
- 4) Potential impacts to Willamette River sediments from historical seeps and spills should be evaluated.
- 5) A figure should be prepared showing the location of underground utilities and conduits.

#### Hydrocarbon Recovery Proposals

- 1) Where did the Saltzman Creek Flume seep occur? Should hydrocarbon recovery efforts be considered in that area?
- 2) Determination of the recovery rates from the Holbrook Slough recovery trench will be important in evaluating the future utility of this system. Consideration should be given to expanding this system based on this information.
- 3) Bail down tests should be considered for all wells with enough free phase hydrocarbon to be bailed out rather than limiting it to greater than 0.5 feet as proposed. This information should be used to evaluate the volume of hydrocarbon present in the formation and well as the suitability of each well for hydrocarbon recovery operations.
- 4) A more technical evaluation of the potential effectiveness of the water table depression wells should be performed, perhaps including closely monitored field tests. It would appear that the effectiveness of such wells in the Holbrook Slough area (IT-E, IT-W and B-33) was limited by the complex subsurface conditions (stratigraphy

Memo To: Jill Kiernan  
February 1, 1995  
Page 3

and utilities). The effectiveness of RES-Old is unknown and the effectiveness of the 12" Shell recovery well was suggested to be limited because of system design. Such wells may still be effective recovery methods if sited and designed properly.

cc: Mike Rosen  
Mavis Kent

*What's the status of this well*

State of Oregon  
Department of Environmental Quality

Memorandum

Date: January 26, 1995

To: Jill Kiernan, Project Manager  
From: *Mavis D. Kent*  
Mavis D. Kent, Project Hydrogeologist  
Subject: Review Comments, Draft Interim Action Plan, Willbridge Facilities

I have reviewed the above referenced draft plan and have the following comments.

1. **General Comments** I concur that Interim Actions are warranted at this time given the ongoing discharge of contaminated groundwater into the Willamette River. Interim Actions proposed in the draft plan provide primarily for continuation of existing actions with the addition of new equipment and modified schedules. Because the seepage of contaminated groundwater into the Willamette River appears to continue, despite operation of the existing trench, recovery well and product recovery efforts, it would seem that a more aggressive Interim Action than proposed would be warranted.
2. **Section 2.3.2, Concentration and Distribution of PAHs** The text on page 2-15 discusses the concentration and distribution of PAHs in groundwater, referring to Table 2-4 and Figure 2-6c. The map of Figure 2-6c should be constructed similarly to Figure 2-6a for BTEX, where the total concentration is shown and the constituent with the highest concentration noted in parentheses. The PAHs are similar to BTEXs in that there are several constituents in the group with varying toxicities. Some of the PAHs detected at the site are toxic to fish at very low concentrations. Because groundwater discharge is directly into the river, PAH concentration is of concern.

*+ Did  
Chm  
do a  
benzene  
map?*

In considering the groundwater contour map of Figure 2-4, it appears that flow of groundwater in the area of the cutoff trench has a radial aspect. Some of the higher detections of PAH's in the area of the cutoff trench, borings B-20 and B-35, appear to be where groundwater flows beyond, or around, the trench. This suggests that groundwater contaminated with PAHs may be discharging into the Willamette River. For example, of the constituents listed in Table 2-4, benzo(a)anthracene, benzo(b)fluoranthene and dibenzo(ah)anthracene exceed EPA fish toxicity values. Boring B-20 appears to be within 100 to 200 feet of the river margin. The proposed groundwater monitoring program should also include sampling Willamette Rive water near shore to determine whether PAHs can be detected at levels of concern. The draft plan does not provide analytical data for the recovery well RES-N, but analyses for PAHs should be included for the treatment influent if not already.

Memo To: Jill Kiernan, Project Manager  
January 26, 1995  
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*Wanted monthly water levels  
; product thickness*

3. **Groundwater Monitoring Program** The proposed groundwater monitoring program provides for quarterly measurement of water levels in the Willamette River and in monitoring wells listed on Table 4-2. Product thickness measurements are to be made on a monthly basis. It would seem appropriate to measure water levels also on a monthly basis since part of the decision-making criteria for future monitoring program modifications are groundwater level trends. How will the two months' worth of product thickness data be related to quarterly groundwater levels? The most variable and sensitive parameters in the site groundwater system would seem to be water levels and thickness of product, versus dissolved constituents (which are proposed to be sampled quarterly).
4. **Interim Action Alternatives Proposed** Three alternatives have been proposed and evaluated. The third alternative, extraction and treatment of dissolved phase constituents, was eliminated. A fourth alternative should be considered because of the potential discharge of PAHs of high fish toxicity into the Willamette River, around the existing cutoff trench. The fourth alternative would be expansion of the existing cutoff trench. A goal of seep and groundwater and Willamette River water monitoring, and an evaluation of the effectiveness of the cutoff trench, should be to form the basis for developing this fourth alternative. Whether this alternative is included in this plan, or referenced as a forthcoming separate plan, expanded groundwater seepage cutoff should be evaluated.
5. **Existing System Operation Evaluation** There should be further discussion in the text on how the evaluation of the effectiveness of various systems and procedures will be accomplished. What data is required for the evaluation and methods to be used including any planned modeling efforts. Actually, it seems as if this document would more appropriately be a plan to evaluate existing system efficiency for the purpose of later submittal of a plan for Interim Actions that could include modifying or expanding current systems, and/or proposal of new Interim Action elements. The goal of an initial Interim Action at this site would seem to be first to cutoff discharge of groundwater into the river. This draft plan seems makes this clear, but then seems to gratuitously include a dissolved extraction alternative that does not address the objective of the action and is then discarded without the plan really proposing anything new.

If you have any questions about my comments or wish to discuss them I will be available. Perhaps a meeting with all draft plan reviewers is in order.



## MEMORANDUM

**CHM HILL**

**TO:** Joe Comstock/Unocal  
Tim Johnson/Chevron  
Rob Pace/Shell

**COPIES:** Terry Fisk/GeoEngineers  
Paul Woods/SECOR  
Gregory Kupillas/Hart Crowser

**FROM:** Scott McKinley  
Ross Rieke

**DATE:** February 1, 1995

**SUBJECT:** Doane Avenue (RES-New) Interim Action Performance Review

**PROJECT:** OPE39281.IA.DA

The purpose of this memorandum is to evaluate performance monitoring information collected during the recent operation of the RES-New groundwater extraction and treatment system and identify additional or different measures to reduce petroleum hydrocarbon seeps/sheens present in the vicinity of New Doane Avenue storm drain outfall.

### 1.0 Background

In 1987 Reidel Environmental Services (RES) constructed a clay barrier across the new Doane Avenue storm drain trench to block floating product migration through the backfill surrounding the 60-inch diameter drain pipe. To recover product trapped by the clay barrier, an extraction well was installed on the upgradient side of the barrier. The extraction well (RES-New) was operated by Unocal between October 1987 and August 1994 and proved to be very effective at capturing floating product when equipped with a dual pump recovery system. Reidel reported the recovery of 1,070 gallons of diesel in the latter part of 1987, 2,500 gallons in 1988, 500 gallons in 1989, 220 gallons in 1990 and 0.2 gallons in 1991. Due to the decrease in volume of product removed, the well was switched over to a single pump, total fluids system, and operated until August 1994 when it was shutdown.

### 1.1 Current Situation

In September 1994, shortly after shutting RES-New down, Unocal observed petroleum hydrocarbon seepage along the river bank in the vicinity of the new Doane Avenue storm drain outfall. To control the seepage, pumping of RES-New was resumed on October 7, 1994. A groundwater treatment system was installed at the wellhead and a 60 day NPDES permit obtained to enable treated water to be discharged to the Willamette River. The current extraction and treatment system consists of a total fluids recovery pump, gravity separation of floating product (if present) and a tray aeration and carbon adsorption system for removal of dissolved phase hydrocarbons. Biological fouling and silting of the filtration

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and air stripping components have rendered the treatment system inoperable and it was shutdown in early January.

### **1.2 Product Migration Pathways**

The conceptual understanding of subsurface conditions in the vicinity of the new Doane Avenue storm drain and well RES-New indicates the presence of three potential floating product migration pathways. The first pathway is the backfill material in the new Doane Avenue storm drain trench which acts as a preferred migration path because of its higher permeability and lower residual saturation. Depending on the free volume of floating product available and distribution of residual phase product in the backfill, the trench is believed to be the primary pathway for floating product migration to the river. RES-New pumping and the clay barrier are designed to control product seepage through this pathway.

Based on recent observations of hydrocarbon seepage along the riverbank, product also appears to be moving along the water table surface through native aquifer material. The distribution and seepage volume is greatest during periods of low river stage and concentrated at the interface between the shallow sand aquifer and silty/clay aquitard. This pathway appears to be quite broad, extending for up to 140 feet along the riverbank on both sides of the new Doane Avenue storm drain outfall. There are no mechanisms in place, other than the floating boom, to contain product seepage through this pathway.

The third pathway, which has not been investigated, is the storm drain pipe. Infiltration of floating product and dissolved phase hydrocarbons through joints in the drain pipe may occur at sections between the St. Helens Highway and the river and along Front Avenue when the pipe is partially submerged during high groundwater elevation conditions. Product may also be entering the storm drain through uncontrolled surface discharges to catch basins in facilities that drain into the Doane Avenue storm drain. Product potentially entering the storm drain pipe would be rapidly carried to the river and contained by the floating boom around the outfall.

## **2.0 RES-New System Performance Review**

Groundwater extraction and treatment system monitoring data collected by GeoEngineers between October and January 1995 included measurement of influent and effluent BTEX, TPH, iron and lead concentrations and monitoring of water levels in selected wells in the vicinity of RES-New. Periodic observations of seepage along the riverbank were also performed to assess the overall effectiveness of the RES-New program.

### **2.1 Treatment System Performance**

Laboratory test results from influent monitoring show total BTEX concentrations (Table 1) less than 5 ug/l and TPH levels below 10 mg/l in the three samples collected through

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November 22, 1994. The results seem low given the concentration of petroleum hydrocarbon constituents detected in other nearby monitoring wells (Table 1) and the levels of product detected in RES-New. Between October 7, 1994 and November 4, 1994 the floating product thickness in RES-New increased from 0.11 feet to 1.95 feet, declining to 0.55 feet by the end of December.

Laboratory test results from effluent monitoring (Table 1) show the treatment system has generally met performance requirements when operating. However, plugging of the carbon units by silt and sand entrained in the water stream and biological fouling in the tray stripper have resulted in numerous system shutdowns. An inline filtration system was installed to reduce the carbon plugging problem, however, the filter requires changeout every few days.

Biological fouling (biofouling) conditions in the tray stripper result from biological processes involving organic carbon, iron and manganese. Petroleum hydrocarbons present in groundwater represent a source of carbon and energy for cell metabolism. When groundwater containing dissolved phase hydrocarbons comes in contact with the highly oxygenated conditions of the tray stripper, optimum conditions for cell growth are created. The microorganism source is most likely the groundwater. The shallow water table, age of hydrocarbon releases and environmental setting, are supportive for the growth of an adaptive microorganism population.

A second potential mechanism producing biofouling, is the oxidation and reduction of iron (and manganese) by microorganisms utilizing these compounds in combination with dissolved hydrocarbons to derive energy for cell metabolism. The first step of the process is reduction of ferric iron ( $\text{Fe}^{3+}$ ) to ferrous ( $\text{Fe}^{2+}$ ) iron which generally occurs within the anoxic conditions of a contaminated aquifer. The microorganisms use ferric iron as an electron acceptor, in lieu of oxygen, to derive energy from the oxidation of dissolved hydrocarbons. This process results in an increase in dissolved ferrous iron concentrations (19 mg/l detected in RES-New influent stream) and a graying of the soil color produced by the removal of ferric iron responsible for the brown color of most soils. The soil color graying process has been widely observed in soils below the water table at the Willbridge site. When the iron rich groundwater enters the highly oxidized environment of the tray stripper, it is converted back to ferric hydroxide precipitating as a hydroxide or carbonate scale, or ferrous hydroxide which appears as a reddish brown to black gelatinous slime.

Conditions responsible for biofouling may be controlled through one or more of the following: (1) chlorination of the influent stream to control microorganism growth (2) a regular high pressure wash maintenance program to remove cell mass from the stripper and extraction well (3) use of an alternate treatment process.

### 2.2 Hydraulic Performance of RES-New

The water level monitoring conducted in wells B18, B22, B37, B38, B39, B40 and B41, which lie within 50 feet of well RES-New, show no apparent hydraulic influence at

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pumping rates between 6 and 13 gpm. While the water level in RES-New dropped after the October 7, 1994 startup (Figure 1), water levels in the other nearby wells have not been affected. Recharge, in the form of heavy rainfall to the shallow aquifer during this period, may prevent pumping induced water level influences from being detected.

The ability of RES-New to influence groundwater flow and product migration pathways beyond the boundaries of the trench is expected to be marginal. The well is screened in the gravel backfill of the trench which can be viewed as a long narrow aquifer that exists semi-independently of the Willbridge shallow aquifer. Depending on the extent of backfill material in the trench and its permeability, recharge to well RES-New (Figure 2) will come from the trench first, and the shallow aquifer second. During high river stage periods, recharge from the Willamette River may also flow to the well through the storm drain trench. All of these conditions are expected to limit the ability of this well to be an effective mechanism for influencing groundwater flow and product migration pathways beyond the trench boundaries.

### **2.3 Seep Monitoring**

Although no formal seep monitoring activities were completed until January 1995, regular visits to the site by GeoEngineers and CH2M Hill indicate RES-New pumping has not produced a noticeable and consistent decrease in the extent of hydrocarbon seepage. Seepage has been observed along a 90 foot wide section of riverbank on the south side, and a 50 feet section north of the storm drain outfall. Seepage is generally visible at the interface between the shallow sand aquifer and silty/clay aquitard during periods of low river stage when the maximum hydraulic gradient along the shoreline occurs.

### **2.4 Conclusions on RES-New Performance**

Evaluation of the RES-New monitoring data indicates the following:

- The current pump placement in RES-New, five feet from the bottom of the well opposite the silty/clay aquitard, does not permit floating product recovery. The fate of product that accumulates in the well under these conditions cannot be readily predicted. In the absence of a removal process, product is expected to eventually fill the water table depression and stabilize, or continue to migrate through the trench eventually bypassing the clay barrier.
- The location of RES-New within the permeable backfill of the new Doane Avenue storm drain trench, limits the well's ability to affect groundwater and floating product transport pathways beyond the trench boundaries.

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- Silt and fine sand trapped in the filtration unit at the wellhead result from high well screen entrance velocities opposite the pump and a well screen filter pack potentially incompatible with the characteristics of the shallow sand aquifer and silty/clay aquitard. Biologic material also detected in the filtration unit is an indication of microorganism activity within the well casing.
- Biofouling conditions in the tray stripper result from the mixing of oxygen with dissolved hydrocarbons in the highly oxygenated conditions of the tray stripper. The stripper, which removes volatile dissolved hydrocarbons, creates a highly favorable environment for microorganism growth. The use of air stripping methods for groundwater treatment will require an aggressive maintenance program and pretreatment controls to maintain treatment system performance.

### 3.0 Interim Action Options for the Dock Area

The continued presence of hydrocarbon seeps and sheens along the Willbridge Facilities riverbank represents an immediate, potential risk to the environment. The RES-New monitoring data coupled with seep observations indicates additional measures beyond those proposed in the Interim Action Plan may be necessary to mitigate this potential risk.

Three potential actions for consideration include:

- **Passive Containment.** This option would keep well RES-New shutdown and rely on boom containment equipment already in place along the river frontage to intercept and contain product seepage.
- **Upgrade RES-New Extraction and Treatment System.** A floating product skimming pump would be installed in the existing well, or a replacement well, and operated concurrently with a groundwater extraction pump to create a water table depression drawing floating product towards the well for removal. The treatment program would be modified to include periodic high pressure washing of the tray stripper and chlorination of the influent stream to control biofouling conditions.
- **Construction of an Interceptor Trench.** A new trench, similar to the existing Holbrook Slough cutoff trench would be constructed along the Unocal/Chevron riverbank to significantly increase the ability to control groundwater flow and intercept floating product before it reaches the river.

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The following subsections present conceptual level information on each of these actions, discuss their advantages and disadvantages and summarize the principle cost elements. The actions have been developed based on the RES-New monitoring data and information presented in the Interim Action Plan.

### **3.1 Passive Containment**

The passive containment option would permanently shutdown well RES-New and rely on natural processes to flush floating product from the aquifer to the riverbank where product would be contained by floating booms already in place.

The advantages of this option are its relative simplicity, and relatively low operation and maintenance costs. Its primary disadvantage is the formation of dissolved phase contamination once the product comes into contact with surface water, and potential exposure to floating product residuals in the containment area between skimming events. Regulatory agencies such as the Coast Guard may require that the sheen be prevented from occurring in the first place.

The primary cost elements of this alternative would be a inclusion of a sea (submerged) curtain to prevent escape of product sheens and subcontractor costs to skim accumulated product from the containment area.

### **3.2 Modifications to Well RES-New Extraction and Treatment System**

As constructed, well RES-New can be effective at creating a hydraulic trap to intercept product migrating within the new Doane Avenue storm drain trench. The current placement of the pump near the bottom of the well does not allow floating product to enter the pump intake. Raising the existing pump to position the intake at the oil-water interface would allow a mixture of oil and water to enter the pump. However, this interface is a dynamic boundary constantly rising and falling in response to pumping and recharge induced water level changes, and would require frequent pump depth adjustments to maintain performance. Additionally, the existing pump tends to emulsify the oil/water mixture making treatment more difficult. Installation of a water table tracking skimmer pump, operated concurrently with a water table depression pump, would address both of these issues and increase the effectiveness of the RES-New system.

Replacement of the 12-inch well casing is not recommended at this time. There are no obvious problems with the existing well design, however, without particle size analysis, the suitability of the 0.01 inch slot size and sand pack cannot be verified. The integrity of the 12-inch well casing is also thought to be satisfactory, though blockage of screen opening by hardened biofilms may be affecting the wells hydraulic performance. However, because the well is experiencing sand pumping problems, replacement of the 8-inch well casing with a prepacked, 8-inch diameter channel screen should address this problem. Additionally, the

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interior of the 12-inch casing should be roto-brushed and shock chlorinated to remove biological growths.

The advantages of this option are its moderate cost and ease of implementation. The primary disadvantage is this option may have limited effectiveness on product migration pathways outside the trench boundaries or within the storm drain pipe. Depending on the effectiveness of the pretreatment processes, the well and treatment system may require significant ongoing maintenance.

The primary cost elements include the purchase of a skimmer pump and installation of pneumatic power source, purchase and subcontractor installation of 8-inch diameter pre-packed channel screen and rehabilitation of the 12-inch screen, and increased operation and maintenance costs necessary to keep the treatment system operational.

### 3.3 Installation of an Interceptor Trench

The Willbridge shallow aquifer is an unconfined aquifer system with a saturated thickness that declines from approximately 15 feet in the tank storage areas on the west side of the site, to five feet in the dock area, and eventually to a foot or less at the river's edge. The average saturated thickness in the dock area varies seasonally due to water table fluctuations and the undulating nature of the silty/clay aquitard's upper surface. Containment and prevention of seepage from an aquifer with a small saturated thickness, is generally more effective with an interceptor trench than a groundwater extraction well(s), especially if standard trench construction methods can be used and no major underground obstacles exist.

The interceptor trench would operate with the overall objective of creating a hydraulic barrier to intercept floating product and dissolved phase hydrocarbons before they reach the river. The design would be similar to the existing Chevron trench which intercepts and conveys floating product and dissolved phase hydrocarbons to an onsite treatment facility.

The trench alignment would parallel the riverbank, intersecting known and potential pathways where seepage occurs. While there is some flexibility in selecting the final location, there are a number of conditions that must be considered. The depth is critical because it effects the constructability and final cost. Underground utilities and surface obstructions also affect constructability and may require special design considerations. Once the trench becomes operational, groundwater flow patterns within the shallow aquifer will change. The trench alignment must be responsive and include an operational safety factor to respond to these changes.

The drain pipe would be constructed of slotted PVC or steel screen (Figure 3) with a high percentage of open area to ensure sufficient hydraulic capacity exists to intercept 100 percent of the flow for the range of conditions present at the site. The screened portions of the trench will be imbedded in a granular fill envelope to trap fine grained material and promote product and groundwater flow through the screen. Fluids will move by gravity flow to

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sumps located at low points on the alignment for collection and pumping to a treatment system influent holding tank. Cleanout access is located at high points on the alignment.

The base of the interceptor drain trench would be excavated into the top of the silty/clay aquitard so the flowline elevation for the drain is at the base of the aquifer. This configuration is necessary to prevent groundwater flow beneath the drain. An impermeable geotextile fabric would also be placed on the downgradient side of the trench to prevent floating product from flowing through the trench, while also reducing infiltration from the river into the trench.

An effective trench design requires accurate information on the depth and topography of the silty/clay aquitard. Because of the limited information available along the waterfront, a cone penetrometer or surface geophysics survey is recommended to select a trench alignment that is cost efficient while also meeting the performance objective.

The advantages of the trench option are: the high degree of performance, reliability and environmental protection provided, reduced liability and capability to play an important role in a long-term site management program. The disadvantages are its significantly higher capital cost. Annual operation and maintenance costs may be similar to the other two alternatives but will likely decrease as confidence in system performance and operation is gained.

The primary cost elements include: the cone penetrometer or surface geophysics survey, design, construction and annual operation and maintenance costs.

### 3.4 Recommendations

An effective remediation program in the Unocal/Chevron dock area requires the establishment of a clearly defined goal(s) consistent with the long-term site remediation strategy. The *Interim Action Plan* (CH2M Hill, November 1994) identified seep prevention as the primary goal for this area and prescribed a monitoring program to generate data enabling the performance of existing containment and removal measures to be evaluated. Because this program is just getting underway, no comprehensive monitoring data have yet been obtained.

Prior to selecting one or more additional interim actions, information on floating product migration through the aquifer on either side of the storm drain trench and through the storm drain pipe should be developed. The information gathering should include:

- (1) Contouring and mapping of water level and free product thickness data collected during the January 1995 LAP monitoring event to identify groundwater (floating product) migration pathways



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(2) A comparison (overlay) of the January 1995 groundwater flow map with a contour map of silty/clay aquitard to identify potential geologic influences on groundwater (floating product) flow pathways

(3) Collecting water samples from manholes along the Doane Avenue stormdrain upstream and downstream of the Willbridge facilities to assess for possible infiltration of product. Depending on the results of this effort, a video survey of the pipe interior may be performed to confirm infiltration locations.

(4) Performing product identification analysis where possible to identify the types of product(s) migrating through the various pathways.

This information, in conjunction with the current understanding of site conditions, will assist further development of the alternatives described and lead to a selection that meets the long term goals of the site.

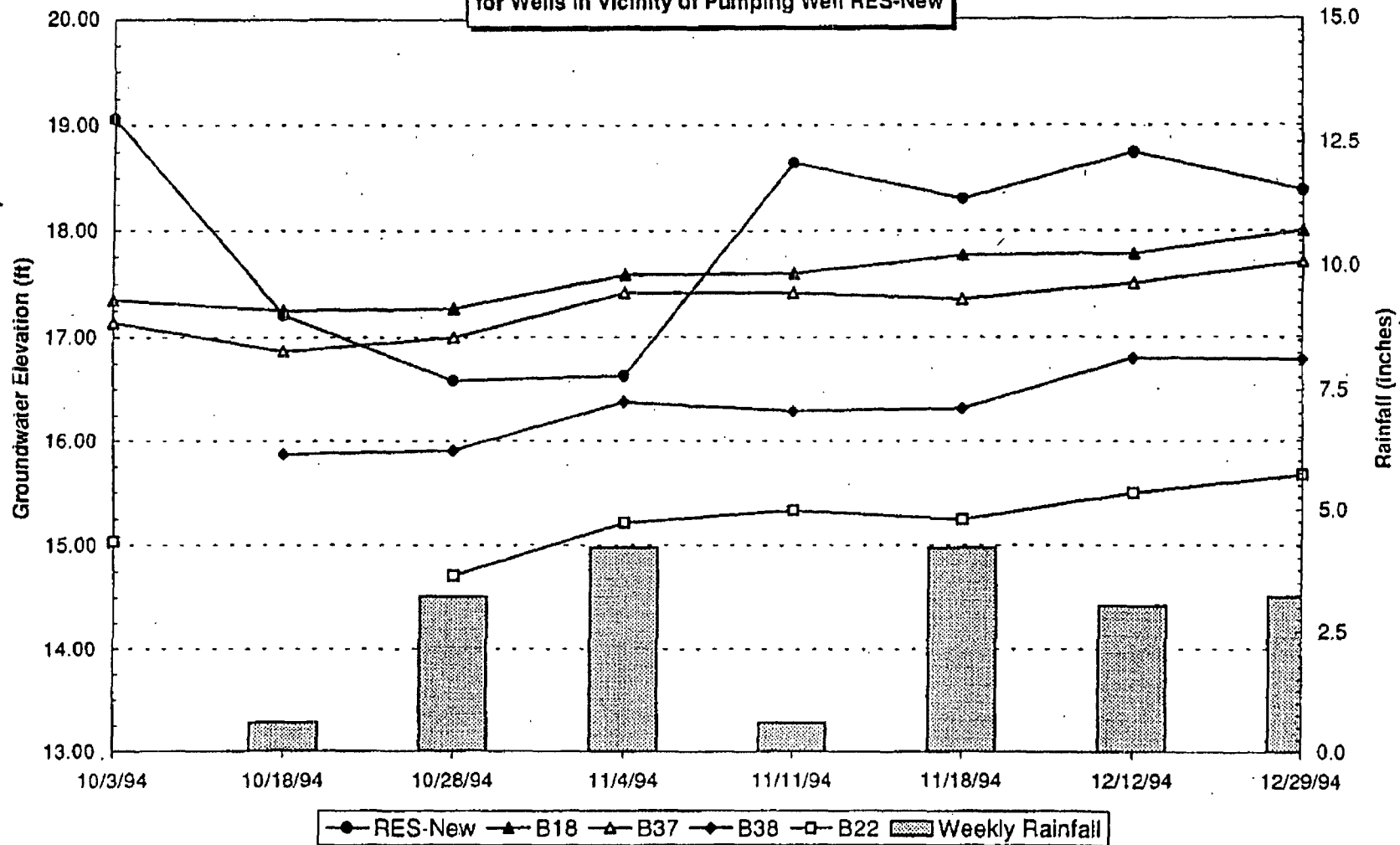
**Table 1**  
**Water Quality Monitoring Summary**  
**Willbridge Facilities - RES-New**  
**October to January 1995**

Sample Date	Aromatic Volatiles (ug/l)				TPH-418.1 (mg/l)	Iron (mg/l)	
	Benzene	Toluene	Ethylbenzene	Xylenes		Dissolved	Total
Influent							
Oct. 7, 1994	1.2	< 0.5	< 0.5	0.85	7.4	na	na
Oct. 14, 1994	na	na	na	na	na	22	19
Nov. 22, 1994	na	na	na	na	9.7	na	na
Chevron Dock Area Monitoring Wells-Oct. 1994							
B10	9.1	3.7	2.5	12	4		
B14	370	21	110	48	2.8		
B20	2.1	2.2	0.7	2.9	12		
Effluent							
Oct. 7, 1994	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Oct. 14, 1994	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.1	< 0.1
Oct. 21, 1994	na	na	na	na	< 0.5		
Nov. 4, 1994	< 0.5	< 0.5	< 0.5	< 0.5	1.2		
Nov. 15, 1994	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Nov. 21, 1994	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Nov. 28, 1994	< 0.5	< 0.5	< 0.5	< 0.5	1.8		
Dec. 13, 1994	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Dec. 20, 1994	< 2.5	3.4	< 2.5	12	100		
Dec. 27, 1994	< 0.5	< 0.5	< 0.5	< 0.5	0.72		
Jan. 4, 1995	< 0.5	42	< 0.5	190	220		

**Notes:**

(1) See Appendix A for a complete description of treatment system monitoring data.

Figure 1  
Groundwater Elevation Hydrograph  
for Wells in Vicinity of Pumping Well RES-New



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SUBJECT

BY

S. McKelley

FIGURE 2

SHEET NO.

of

DATE

1-20-95

Conceptual Groundwater Flow Diagram

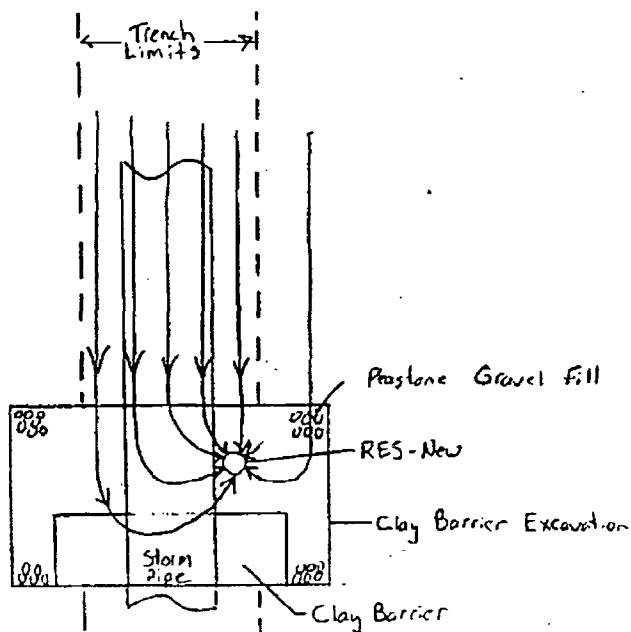
PROJECT NO.

OPE 39291, IA, DA

RES-New

## PLAN VIEW

- LEGEND**
- Groundwater Flowline
  - ▼ Water Table Elev on 11/7/94



## PROFILE VIEW

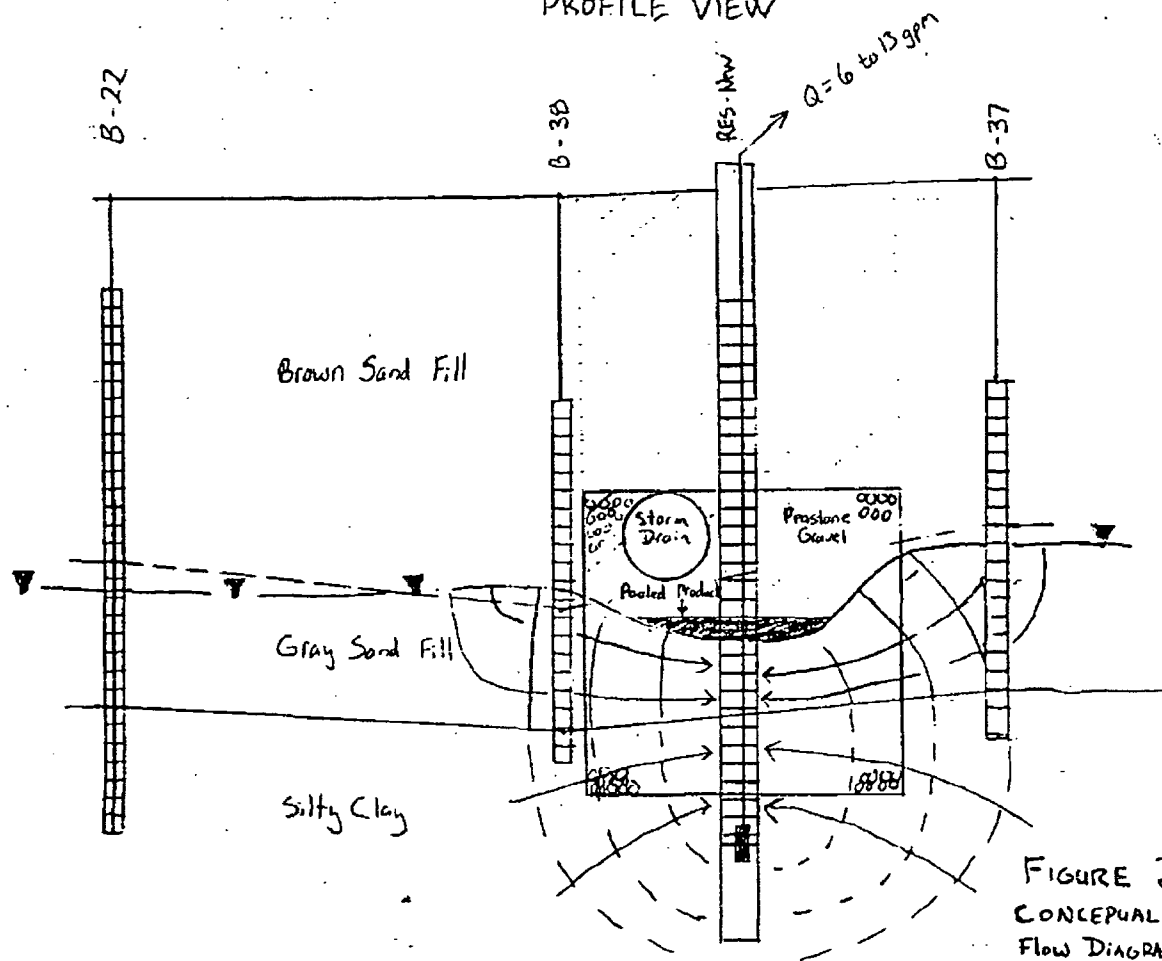
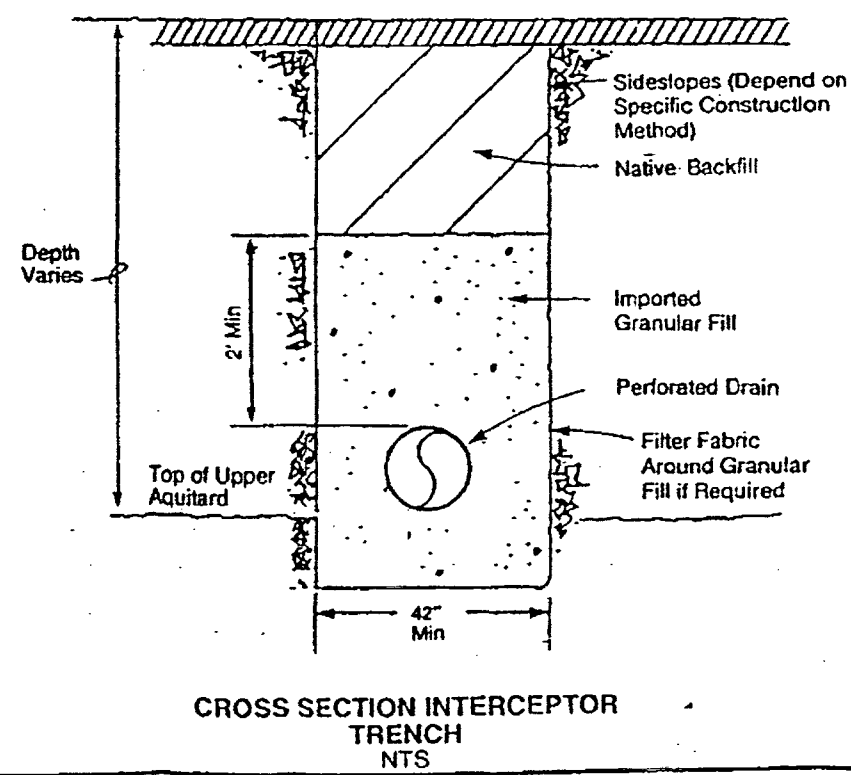
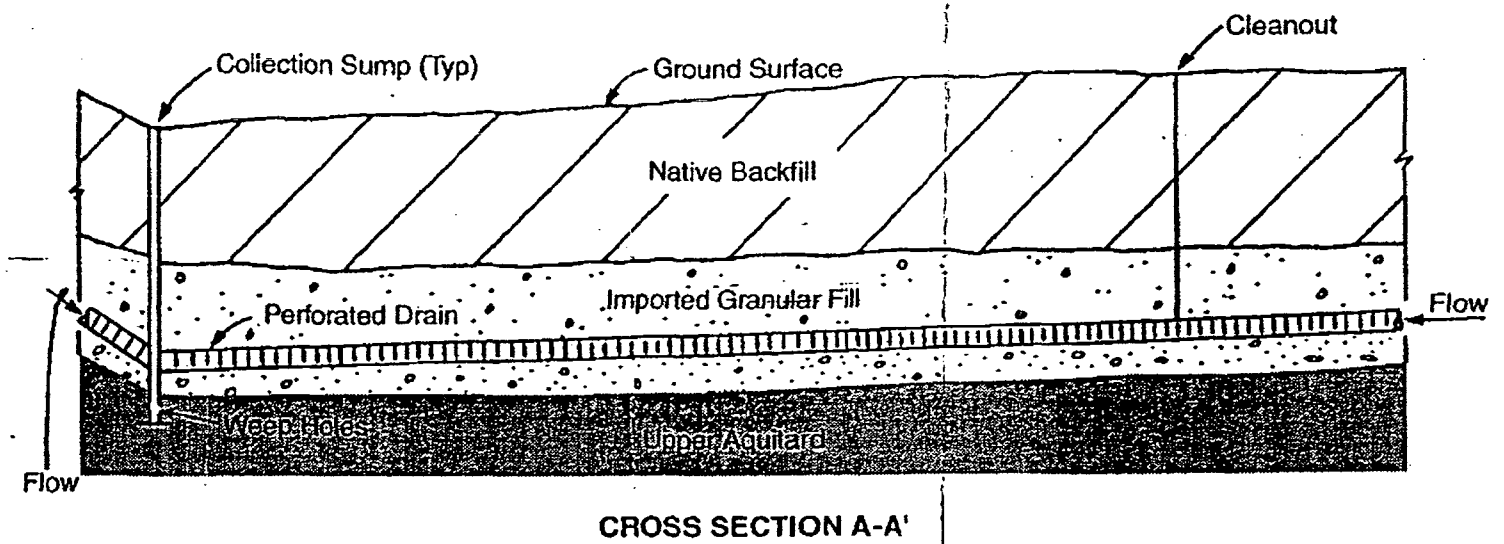
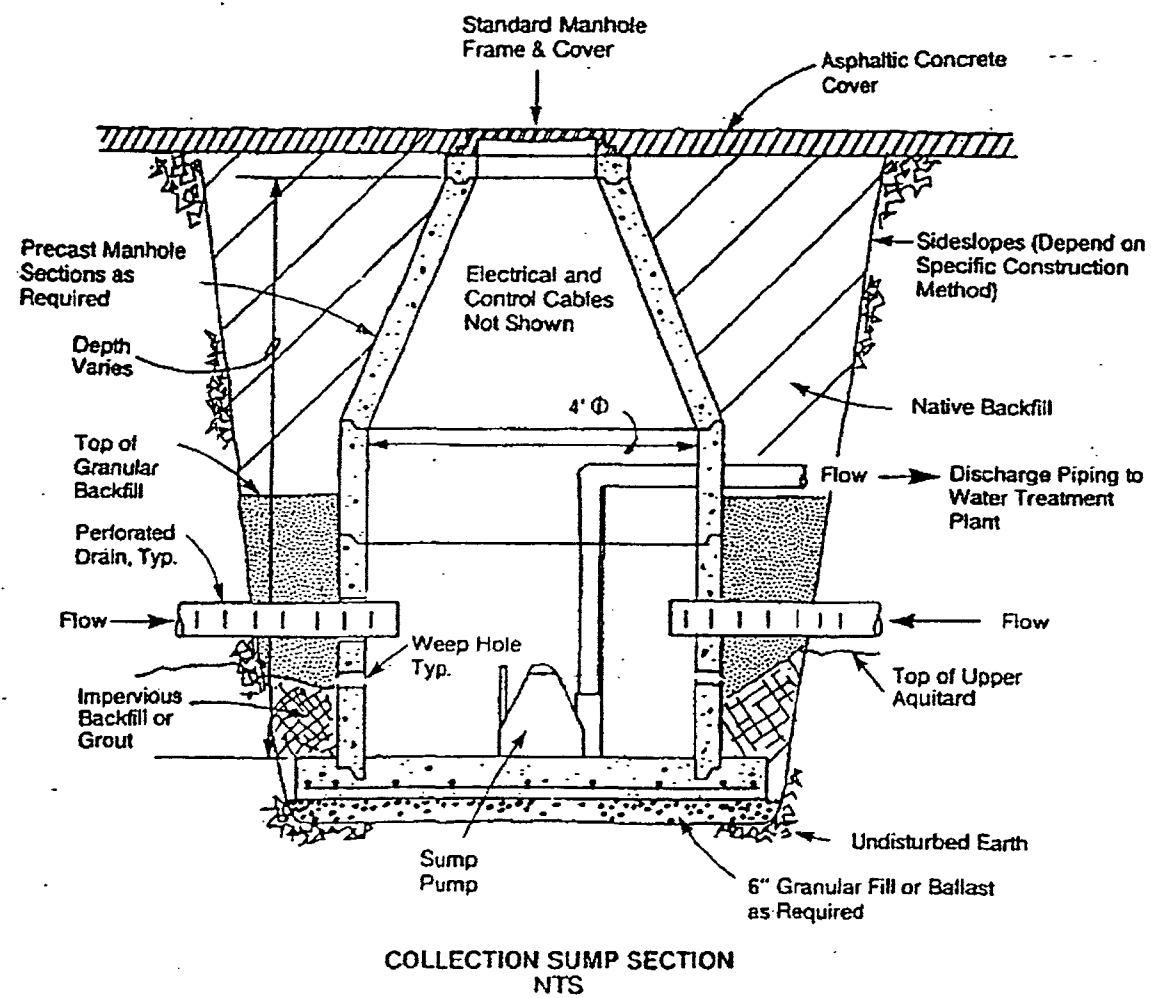


FIGURE 2

CONCEPTUAL GROUNDWATER  
Flow Diagram - RES-New  
Willbridge Facilities

COPPOR00012548



**Figure 3**  
**CONCEPTUAL INTERCEPTOR TRENCH DIAGRAM**  
Willbridge Facilities  
Portland, Oregon

State of Oregon  
Department of Environmental Quality

Memorandum

Date: March 15, 1996

To: Jill Kiernan, Project Manager, Willbridge Facilities  
*Mavis D. Kent*  
From: Mavis D. Kent, Project Hydrogeologist

Subject: Review of Interim Action Work Plan, February, 1996

I have reviewed the Willbridge Facilities Riverfront Interim Action Work Plan and have the following comment. Let me know if you want to discuss my comments.

1. I still concur with interim actions to address the continued seepage of site contamination into the Willamette River. I think we need to reinforce the concept however that even though we concur with interim actions for the time being, at some point an RI and FS will need to be completed for the site.
2. It is my understanding that part of the ineffectiveness of the existing vertical barrier is that it does not operate continuously. They point out in their Plan that last year during winter, spring and late fall, the existing barrier was under water and not operating. The currently proposed vertical barrier would incorporate the existing barrier system. Would one of the criteria for success of the proposed vertical barrier system (see section 5.0) need to be year-round operation? If so, will the existing barrier be modified to make this so?
3. The Plan indicates that the first step to developing the barrier design is sampling the new Doane Avenue storm drain system, and if, in this process, it is discovered that most of the contamination is flowing through pipe itself, then reassessment of the need for the barrier will occur. It is not clear to me how this could be done on the new drain system data only. If there already an estimate of the volume of contamination seeping into the Willamette River against which to gauge the volume of contamination that may be found in the new drain pipe? It seems that there is uncertainty as to the importance of the fill/native material contact potential migration pathway. If seepage is noted all along the water front area, how will repair of the drain pipe control other areas of seepage. It seems premature to be talking about rethinking the barrier yet.
4. In their section 6.2 they suggest that they will develop, evaluate and select an alternative under the Revised Cleanup Law to the extent possible, and that DEQ's role will be concurrence. It seems to me that the Revised Cleanup Law still gives DEQ the role of selecting the alternative.
5. It is stated in the Plan that they will not be following the typical draft, submittal, comment, final document process because of time constraints. Perhaps some other mechanism could be set up here to allow them to operate on the aggressive schedule they have developed and allow DEQ more of a role in the process than simply being informed. In the past, any comment we have made on documents are turned aside on what seems to be the basis that the work is already done and it is too late.

## MEMORANDUM

**CH2M HILL**

**TO:** Joe Comstock/Unocal  
Tim Johnson/Chevron  
Rob Pace/Shell

**FROM:** Ross Rieke/CH2M HILL PDX

**COPY:** Scott McKinley/ CH2M HILL CVO

**DATE:** March 6, 1995

**SUBJECT:** Response To DEQ Comments on Interim Action Plan

**PROJECT:** OPE39281.PM.CM

For the purposes of discussion within the PRP group, here is a brief summary of our initial thoughts regarding DEQ's comments on the Interim Action Workplan. Please give me a call and let me know when you would be available to discuss these comments. I don't think we need a meeting but we do need to discuss them together over the phone. We don't need to submit a revised IA workplan but most of these comments will need to be addressed through the RI workplan. I also plan to discuss our responses with Jill (and document the discussions) as she proposes in her cover letter.

### General Comments:

DEQ appears to be looking for some eventual control of the seeps into the Willamette River. They are willing to let us run the program we have proposed but they have a limit to how long they are willing to let us run the Holbrook Slough cutoff and recover product from existing wells without additional measures if seepage is not controlled. Jill seemed comfortable with letting us run the proposed program for "several" months and monitoring the performance as indicated by the reduction in seepage. If no significant improvement is seen after that time, DEQ will be looking for additional seepage control actions. Given that it is unlikely that the free product recovery program will have a significant impact on the seepage in the next "several" months, it is likely that we will be getting pressure from DEQ in the future to look at additional seepage control measures. I think we need to continue to emphasize to DEQ the fact that seepage has been occurring for years and we should move deliberately in assessing the seepage conditions and implementing any major control measures for an effective long-term solution.

### Specific Comments:

#### CHAPTER 2

1. Seepage into Saltzman Creek flume is not currently occurring. We need to review historical data to see if we can pinpoint where the seepage was previously observed. I don't believe the Law report says where the seeps were. We need to check the Shell Shepard report which we have not received.

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## MEMORANDUM

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2. The Law report should discuss the well abandonment. I believe the well locations are shown on the site assessment workplan Hart Crowser developed in the summer of 1990. They are also shown, I believe, in the report prepared by Shepard (the Yellow report) and in the Ecology and Environment reports generated for EPA.
3. The groundwater elevations were corrected for the presence of product.
4. This will take some effort. GeoEngineers has done some of this for around the Unocal and Chevron site. Rob, do you have any of this for the GATX site? We can also research the city files for the Doane Ave., Front Avenue right-of-ways. I doubt that such info is available for inside the walls of the facilities regarding old abandoned lines. Is this true? This task will be part of the RI workplan.
5. I'm not sure why DEQ is so sensitive to this. It's not a big deal to us but I'd like to know if their comment suggests some other issue or concern. Since we are not submitting a revised IA Workplan (it's not required by the order) the comment is relevant only toward future submittals. I can discuss with Jill.
6. These analysis were performed at the Shell and Unocal/Chevron facilities. The data was not included in the IA workplan as it was not relevant to the IA. We can include in the RI workplan.
7. Can do for the RI workplan. Such information is available in the references but our feeling is that tables of the data are of little use for the purposes of the IA workplan.
8. I don't see how you could contour the data given the high variability across small distances and the silty nature of the site soil. I think the best we can say (and we have) is that the greatest thickness' are near the intersection of Doane and Front Avenues. Contouring would give us a false sense that the recoverable free product is distributed in some uniform and consistent manner.
9. Investigations in these areas are anticipated during the RI.
10. The history of ineffective wells, including recent experience with RES-New, continues to suggest that we need to be very careful when, and if, we pump and treat groundwater as part of the IA (or RA for that matter). A further evaluation of pumping groundwater for the purposes of product recovery may be appropriate if we need to consider additional product recovery activities in the future.
11. Our understanding is that little product was being recovered and/or the was no method for disposal of the pumped water. Lets discuss.



## MEMORANDUM

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March 6, 1995

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12. NPDES permit is no longer valid. I've talked with Jill about how the RES-New has been shut down so I'm somewhat confused by this comment.

13. Can try. Need info from facilities, if available.

### CHAPTER 4

14. Need to discuss with DEQ how this is problematic. Can we install a flow totalizer on line to provide at least average flow rates. We understand that a pump cycle counter has been installed on the discharge line. Can this be checked by facility personnel daily?

15. I believe that performance of the cutoff trench is measured simply by whether seeps occur downstream of the trench or not. All other measurements are only indirect measurements of the effectiveness and are primarily performed to provide increased understanding of the site conditions. This performance evaluation is currently underway with the seep and sheen monitoring program.

16. Same as 15. Also, we have in effect performed this with our recent evaluations and discussions.

17. I prefer to emphasize incrementally implementing the free product recovery program and monitor the performance through actual product recovery rates and adjusting/increasing the program based on the measured recovery rates. Daily monitoring of the product recovery may be appropriate initially. Use the observational approach rather than more testing. If justified by field performance, wells with less than 0.5 feet product will eventually be addressed.

18. Addressed in IA implementation plan being developed.

19. Agree. Product ID analysis is part of the IA implementation program.

20. This is an RI issue, not a quarterly groundwater monitoring issue. I'm very uncomfortable sampling Willamette River water for BTEX as part of the quarterly monitoring program. Several samples upstream and downstream would be required to get representative data. Sampling sediments does not belong in a monitoring program either. These concentrations should be stable and thus not necessary to be part of a monitoring program.

*Background needed  
for river  
sampling*

21. I assume we are collecting depth to groundwater when we are measuring product thicknesses. We need to look at the format of Table 4-2 to make sure it is clear and logical re groundwater level measurements. I'm not sure I agree with DEQ if they are suggesting they want groundwater levels measured in wells monthly although it is not uncommon for similar sites.

February 28, 1995

Ross Rieke, P.E.  
CH2M Hill  
825 NE Multnomah, Suite 1300  
Portland, Oregon 97232-2146

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

NORTHWEST REGION

Scott McKinley, P.E.  
CH2M Hill  
2300 NW Walnut Blvd  
Corvallis, Oregon 97330-3538

Re: DEQ Comments on Draft Interim Action Plan for  
Willbridge Facilities

Dear Ross and Scott:

Enclosed are DEQ comments on the *Draft Interim Action Plan, Willbridge Facilities*, submitted by CH2M Hill and dated November 1994. The comments are listed as general comments and specific comments, which reference specific sections and pages of the report.

After you have had a chance to review the comments, I would like to set up a meeting to discuss these comments, implementation of the interim measures, and initiation of the remedial investigation. Note that some of the information requested by DEQ can be addressed during the remedial investigation work plan development or implementation stages. We can discuss these information requests and work scheduling during our meeting.

Please call me at 229-6900 upon receipt of these comments to set up a meeting.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

Enclosure

cc w/encl: Mavis Kent/DEQ/NWR  
Mike Kortenhopf/DEQ/NWR  
Dave St. Louis/DEQ/NWR  
Project File



2020 SW Fourth Avenue  
Suite 400  
Portland, OR 97201-4987  
(503) 229-5263 Voice/TDD  
DEQ-1

COPPOR00012554

**DEQ COMMENTS ON DRAFT INTERIM ACTION PLAN  
FOR WILLBRIDGE FACILITIES**

**GENERAL COMMENTS:**

1. DEQ agrees that interim actions are necessary to address immediate potential risks to human health and the environment and concurs with the proposal to continue the operation of the Holbrook Slough cutoff trench and the new Doane Avenue storm drain containment system (RES-New) in an effort to control hydrocarbon seepage into the Willamette River. DEQ also concurs with the free product recovery proposal using existing wells. However, it is apparent that these systems are not achieving complete containment of the seepage of hydrocarbon contaminants into the Willamette River. The continuing seepage of contaminants despite the operation of the existing containment systems, warrants the need for additional, more immediate, containment measures beyond what is proposed.

DEQ recommends that the Interim Action Plan include a proposal to evaluate additional measures, specifically, expansion of the cutoff trench and/or storm drain containment system or the addition of a new containment system. This evaluation can be conducted as a phased approach; first evaluating the performance of the existing systems, and second, evaluating additional containment alternatives.

**SPECIFIC COMMENTS:**

**CHAPTER 2**

1. Section 2.1.2, page 2-4. Identify locations in the Saltzman Creek flume where hydrocarbon seepage was observed and indicate whether or not the seepage is still ongoing. If seepage is still occurring, additional hydrocarbon recovery efforts should be considered in this area.
2. Section 2.1.2, page 2-4. Identify on a map the locations of the abandoned monitoring wells, W-1 to W-39, on the Shell property and provide the details on how they were abandoned. Also, provide the location of the 12-inch product recovery well.
3. Section 2.1.4, Figure 2-4. Clarify if the groundwater elevations shown in this figure are corrected for the presence of free-phase hydrocarbon.
4. Section 2.1.6, page 2-8. Provide a map showing the locations and the elevation profiles of all underground utilities at the Willbridge site.

5. Sections 2.2.1 and 2.2.2. The references to maximum contaminant levels in groundwater and risk-based cleanup levels should be deleted as cleanup levels have not yet been established for the Willbridge site.
6. Section 2.2.3, page 2-10. Investigation of contamination due to gasoline additives should include 1,2-dibromoethane as well as lead and 1,2-dichloroethane unless historical information is adequate to rule these out as contaminants of concern. Consideration should be given to including analyses for all of these compounds in the groundwater monitoring program at this time in order to more effectively develop the necessary site characterization information.
7. Section 2.3. Historical hydrocarbon thickness and water level data should be tabulated and provided. Additionally, complete summaries of existing groundwater analyses should be provided to complete the data presented in Tables 2-3 and 2-4.
8. Section 2.3.1. Figure 2-5 appears to present sufficient data on the free-phase hydrocarbon thickness to be able to generate a contour map of the hydrocarbon thickness. This would allow an initial estimate to be made of the total amount of hydrocarbon present in the subsurface. Such a map should be used to evaluate the areas where additional monitoring wells may be needed, to expand hydrocarbon recovery operations, or complete delineation of the extent of contamination.
9. Section 2.3.1. No data is presented regarding the occurrence of free-phase hydrocarbon north and east of the Shell facility or on the south end of the Unocal facility. This should be evaluated and additional investigation or monitoring performed as appropriate.
10. Section 2.4.1. A more technical evaluation of the potential effectiveness of the water table depression wells should be performed, perhaps including closely monitored field tests. It would appear that the effectiveness of such wells in the Holbrook Slough area (IT-E, IT-W and B-33) was limited by complex subsurface conditions (stratigraphy and utilities). The effectiveness of RES-Old is unknown and the effectiveness of the Shell 12-inch recovery well was suggested to be limited due to system design. Such wells may still be effective recovery methods if sited and designed properly.
11. Section 2.4.2, page 2-22. Identify reasons for discontinuing the operation of the RES-Old recovery system.
12. Section 2.4.2, page 2-22. Include a copy of the temporary NPDES discharge permit as an Appendix to this Interim Action Plan.

13. Section 2.5, page 2-23. Details of the tank and piping integrity testing program should be provided. Tank bottoms and underground piping that have been inspected or replaced should be identified. A list of additional work to be performed should also be provided, along with a schedule for its completion.

#### CHAPTER 4

14. Section 4.1.1, page 4-2. The monitoring program for the Holbrook Slough cutoff trench should include a determination of product recovery rates.
15. Section 4.1.1, page 4-2. A systems performance evaluation should be conducted on the cutoff trench to determine if modifications or expansion of the system are appropriate. The work plan should specifically identify performance measures to be evaluated, data requirements, and proposed modelling efforts, and include a schedule for conducting this performance evaluation. The evaluation should determine the extent of capture of the free product due to the operation of the trench.
16. Section 4.1.2, page 4-2. A systems performance evaluation should be conducted on the RES-New containment system to determine if modifications or expansion of the system is appropriate. The work plan should identify specific performance measures to be evaluated, data requirements, and proposed modelling efforts, and include a schedule for conducting this performance evaluation. The evaluation should determine the extent of capture of the free product due to operation of the extraction well. Additionally, other pumping rates and schemes should be evaluated to determine optimal extraction rates for maximizing product recovery.
17. Section 4.2, page 4-4. Baildown tests should be conducted at all monitoring well locations with enough free product to be bailed, rather than limited to those monitoring wells where free product thicknesses are greater than 0.5 feet as proposed. This information should be used to evaluate the volume of hydrocarbon present in the formation as well as the suitability of each well for hydrocarbon recovery operations.
18. Section 4.2.3, page 4-6. Additional details regarding the management of recovered product and water should be provided.
19. Section 4.2.4, page 4-7. Consideration should be given to characterizing the type or mix of hydrocarbon products in each well. This information may help identify individual subsurface accumulations allowing more effective siting of hydrocarbon recovery efforts.
20. Section 4.3. The groundwater monitoring program should also include sampling Willamette River water and sediments near shore to determine whether BTEX and PAH compounds can be detected at levels of concern.

Ross Rieke, P.E.  
February 28, 1995  
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21. Section 4.3, Table 4-2. The groundwater monitoring schedule proposes to monitor water levels in the Willamette River and in select monitoring wells on a quarterly basis, however, product thicknesses are measured on a monthly basis. There may be some difficulty in correlating the data as a result of the differing time periods. DEQ suggests that these water level measurements be conducted on a monthly basis, since part of the decision-making criteria for future monitoring program modifications are groundwater level trends.



Portland Office

February 28, 1996

DEPT OF ENVIRONMENTAL QUALITY  
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132597.PM.01

NORTHWEST REGION

Ms. Jill Kiernan, P.E.  
Oregon Department of Environmental Quality  
Waste Management and Cleanup  
2020 S.W. 4th Avenue Suite 400  
Portland, OR 97201-4987

Subject: Willbridge Facilities  
Riverfront Interim Action Work Plan

Enclosed are three copies of our Riverfront Interim Action Work Plan for the Willbridge Facilities in northwest Portland. As we discussed during our meeting at the site in November, the Willbridge PRP Group is continuing to focus its time and resources on the primary potential threat to the environment at the Willbridge site; seepage of petroleum hydrocarbons into the Willamette River. Because the initial interim action implemented in the summer of 1995 has not effectively reduced the seepage of petroleum hydrocarbons into the river, the PRP group is beginning to implement additional interim actions in order to reduce the seepage.

The enclosed work plan presents the program the PRP group is undertaking to identify, assess, and implement additional interim actions at the site to reduce the petroleum hydrocarbon seepage into the river. Based on the rationale presented in the work plan, the additional interim action activities are anticipated to consist of a barrier along the riverfront to intercept the petroleum hydrocarbon seepage. The work plan presents the investigation and design activities that will be performed over the next year to develop a feasible and effective barrier system. The work plan also discusses the currently inferred seepage mechanisms and the features of a barrier system necessary to address these mechanisms.

As described in the work plan, there are several documents that we will be generating as part of the riverfront interim action. These include:

- Storm sewer sampling plan
- Riverfront soil and groundwater sampling plan

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503.752.4271

503.235.2445 FAX  
503.752.0276 FAX

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- Alternatives assessment and preliminary design report
- Final design report.

These documents will be submitted to DEQ according to a schedule which is currently being developed and will be forwarded to you within the next week. A tentative schedule is presented in the Riverfront Interim Action Work Plan. ← Hta!

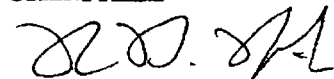
The currently proposed schedule for the Riverfront interim action is very aggressive. This is because our goal is to complete installation of the barrier during low water conditions this year (September-October 1996). As a result of this fast-track schedule, the conventional document submittal process (draft document-DEQ comments-final document) with the agency will not allow enough time to complete the interim action by the fall 1996. However, we see the DEQ as an important partner in the interim action process and we value your input into the project. Therefore we welcome your comments on the documents and anticipate working with you throughout each phase of the project.

We would like to meet with you to discuss any comments, questions, or concerns you may have once you have had an opportunity to review the enclosed work plan. Given the very aggressive schedule we have established for the riverfront interim action program, we are hopeful that we can meet with you in the next few weeks so that we can effectively address your comments as we move forward.

We appreciate your willingness to allow the PRP group to focus their energies and resources on the critical issues at the site through the interim action process rather than performing a classic remedial investigation/feasibility study across the site. We are confident that using the interim action process to directly address the potential threats posed to the environment provides the greatest benefit for all parties. Please call if you have any questions, (503) 235-5022 ext. 4437.

Sincerely,

CH2M HILL



Ross D. Rieke, P.E.  
Project Manager

cc: Rene White, Chevron  
Joe Comstock, UNOCAL  
George Loyd, Shell Oil  
Andrew Holbrook, GATX



April 2, 1996

Ross Rieke, P.E.  
CH2M Hill  
825 NE Multnomah, Suite 1300  
Portland, Oregon 97232-2146

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

Re: Willbridge Facilities  
Riverfront Interim Action Work Plan

NORTHWEST REGION

Dear Ross:

DEQ has reviewed the *Willbridge Facilities, Riverfront Interim Action Work Plan*, dated February 1996. DEQ approves the work plan pending written response to the following comments, which are listed below.

1. It was not clear from the text that the existing Holbrook containment trench as incorporated into a new vertical barrier system, would be modified to effectively operate on a year round basis. Given the ineffectiveness of the Holbrook slough containment trench in controlling the hydrocarbon seeps for most of the year, DEQ expects that one of the objectives of the interim action must be that it effectively control hydrocarbon seeps into the Willamette River on a year-round basis. The design of the vertical barrier must consider seasonal water table and river level fluctuations.
2. Section 6.1.1 states that the appropriateness of the vertical barrier at the riverfront will be reevaluated if sampling suggests that contaminant flow through the storm drain contributes a major portion of the seepage into the river. If contaminant flow through the storm drain is found to be a major contributor to seepage into the river, mitigating interim actions will be taken to address this seepage. However, it was not clear from the text that, in this situation, other areas of seepage along the river bank would be addressed. DEQ expects that all areas of seepage along the river bank be addressed by the interim action, not just the area around the storm drain.
3. The assessment of alternatives described in Section 6.2 must also include consideration of protectiveness. Ultimately, the approved alternative must be protective of human health and the environment.
4. DEQ understands the need for an aggressive schedule for the interim action. However, under the terms of the Consent Order, DEQ approval is required not only for the recommended alternative, but also for the final design. DEQ is willing to work with you and the PRPs to accelerate the review/approval process in order to accommodate the fast-track schedule.

John A. Kitzhaber  
Governor

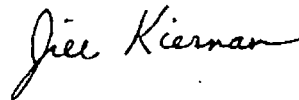


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5. DEQ has previously stated our support of focusing project efforts on interim actions at the site, however, we still have concerns with the delay of the Remedial Investigation and Feasibility Study (RI/FS) process. DEQ would like to see a commitment to initiating the RI/FS process. Therefore, given the proposed schedule provided in the work plan, DEQ requests that an RI/FS Work Plan be submitted within 90 days from the completion of construction of the interim action; the target date for submittal would be February 1, 1997. If construction of the interim action is delayed until September/October 1997, DEQ does not see any justification for delaying the initiation of the RI/FS until after this construction period. Therefore, the RI/FS Work Plan target submittal date of February 1, 1997, is still appropriate.

Please feel free to call me at 229-6900 if you should have any questions on these matters.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Mavis Kent, DEQ/NWR  
Dave St. Louis, DEQ/NWR  
Project File

November 19, 1996

Mr. Irv Jenkins  
Shell Oil Company  
P.O. Box 2099  
Houston, TX 77252-2099

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY  
NORTHWEST REGION

Re: Willbridge Facility

Dear Mr. Jenkins:

DEQ has recently received groundwater monitoring data from the GS Roofing Products facility located at 6350 NW Front Avenue in Portland indicating the possibility of off-site migration of groundwater contaminants from the former Shell Willbridge facility to the GS Roofing facility. The GS Roofing Products facility is directly across Front Avenue from the former Shell Willbridge facility now occupied by GATX. A review of groundwater elevation contour maps from the Willbridge facilities quarterly monitoring reports prepared by CH2M Hill also shows the GS Roofing Products facility to be hydraulically downgradient from the former Shell Willbridge site.

The analytical results from groundwater monitoring conducted at GS Roofing Products during August 1996 show elevated levels of benzene at 940  $\mu\text{g/L}$  and toluene at 220  $\mu\text{g/L}$  in their upgradient well, MW-1. Since the initiation of quarterly monitoring of this well in December 1991, benzene concentrations have ranged from non-detects to 8.6  $\mu\text{g/L}$  and toluene concentrations have ranged from non-detects to 74  $\mu\text{g/L}$ .

These constituents have been found in other monitoring wells on the GS Roofing site; their presence is believed to be associated with two underground fuel storage tanks that were removed from the GS Roofing property over six years ago. The source of the benzene and toluene compounds in MW-1, however, is suspect due its location hydraulically upgradient of the former location of the underground fuel storage tanks.

Quarterly groundwater monitoring results from the Shell/GATX Willbridge facility show benzene, toluene, ethylbenzene, and xylene compounds (BTEX) present in both a free product phase in monitoring well, MW-7, and in high concentrations of a dissolved phase in MW-11. Both MW-7 and MW-11 are located immediately upgradient of the GS Roofing monitoring well, MW-1. The presence of benzene and toluene in the GS Roofing MW-1 suggests that the contaminant plume on the former Shell Willbridge site may have migrated off-site.

Due to the possible off-site migration of the contaminant plume from the former Shell Willbridge facility, DEQ is requesting that Shell initiate measures to investigate the extent of the plume migration. This may require additional

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Governor



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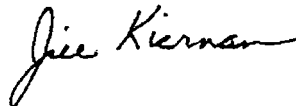
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groundwater monitoring locations and schedules beyond the current quarterly monitoring program. If off-site migration of the contaminant plume is occurring, DEQ may require remedial measures to protect human health and the environment.


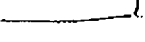
DEQ requests a written response from Shell within 30 days of receipt of this letter, indicating what measures will be taken to investigate the plume migration. I have contacted Mr. Ross Rieke at CH2M Hill regarding this matter and have forwarded him a copy of the GS Roofing Products Co. monitoring results. It is my understanding that CH2M Hill is currently evaluating that data.

Please feel free to call at 503-229-6900 if you should have any questions regarding this matter.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Ross Rieke, CH2M Hill  
Andrew Holbrook, GATX Terminals Corp.  
Rene White/Chevron USA Products Co.  
Joe Comstock/Unocal Corp.  
Himanshu Jani/GS Roofing Products Co.   
Dale Haar/De Minimis, Inc.   
Dave St. Louis/DEQ  
Mavis Kent/DEQ  
Andree Pollock/DEQ PM for GS

RECEIVED SEP 11 1997

Oregon

September 4, 1997

Lance Geselbracht, P.E.  
Pacific Environmental Group  
7320 SW Hunziker Street, Suite 320  
Portland, OR 97223

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

NORTHWEST REGION

RE: Willbridge Terminal  
DEQ Review of Interim Action Work Plan

Dear Lance:

DEQ has reviewed the *Interim Action Work Plan, Willbridge Terminal, Portland, Oregon*, dated June 11, 1997, and submitted by Pacific Environmental Group on behalf of Shell Oil Company, GATX, Chevron Products Company, and Tosco. DEQ approves this work plan pending written response to the comments listed below.

General Comments:

1. DEQ encourages and supports interim remedial actions at the site to address ongoing seepage of hydrocarbons into the Willamette River. Please be aware that approval of this interim remedial action does not preclude DEQ from selecting other or additional remedial measures as part of the final remedy for this site. Additionally, the implementation of this interim remedial action does not release the respondents from their obligations of completing a remedial investigation at the site to determine the nature and extent of contamination, identify migration pathways, and evaluate the risks to human health and the environment. DEQ will not accept any delays with the initiation or conductance of the remedial investigation as a result of the implementation of this interim remedial action.
2. DEQ supports construction of the cutoff wall around the 60-inch Doane Avenue storm drain as this storm drain has been identified as an obvious, continuing migration pathway for hydrocarbon seepage into the Willamette River. However, at this time, DEQ does not support additional interim remedial actions proposed for the Holbrook trench or the old, abandoned Doane Lake 27-inch storm drain, as contaminant extent and migration in these areas has not been adequately characterized. DEQ feels that a better understanding of the contaminant extent and migration pathways in these areas is necessary in order to facilitate the development of protective,

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Governor



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effective, and cost-effective remedial actions. This additional contaminant characterization would be more appropriately addressed during the remedial investigation phase. Upon completion of adequate characterization of contaminant extent and migration pathways in these areas during the remedial investigation, additional remedial alternatives, if deemed necessary for protection of human health and the environment, may be developed as either interim measures or in the feasibility study.

3. In general, the work plan lacks sufficient detail for DEQ staff to fully evaluate the work being proposed. DEQ requests that additional details of the proposed work be submitted as a design report. At the minimum, the design report should contain following:
  - a) detailed description of the interim action to be performed.
  - b) design objectives, criteria, and standards.
  - c) final drawings.
  - d) final specifications.
  - e) construction schedule.
  - f) management/disposal plan for contaminated soils and groundwater removed during construction, including an identification of permitting requirements.
  - g) results of the tracer test, geoprobe investigation, and any other pertinent technical or engineering studies conducted for supporting the design of the interim action.
4. DEQ concurs with automated SPH recovery at selected Tosco wells. DEQ requests that additional details regarding the locations of the specific recovery wells be submitted.

Please feel free to call me if you wish to discuss these comments in further detail. I can be reached at 229-6900.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Mavis Kent, DEQ  
Rene White, Chevron USA Products Co.  
Marty Cramer, Tosco Corp.  
Irv Jenkins, Shell Oil Products Co.  
Eric Conard, GATX

August 6, 1997

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

NORTHWEST REGION

Rene White  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Irv Jenkins  
Shell Oil Products Company  
777 Walker Street  
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Houston, TX 77252-2099

Martin Cramer  
TOSCO Corporation  
5528 Northwest Doane Avenue  
Portland, OR 97210

Erik Hansen  
Shell Development Company  
Westhollow ET-108  
3333 Highway 6 South  
Houston, TX 77082-8101

Andrew Holbrook  
GATX Terminals Corporation  
P.O. Box 83479  
Portland, OR 97283

RE: Willbridge RI/FS Work Plan

Gentlemen:

The purpose of this letter is to reiterate DEQ's expectations of a remedial investigation/feasibility study (RI/FS) Work Plan for the Willbridge facilities.

During a meeting on August 6, 1997, with Lance Geselbracht and Kevin Freeman of Pacific Environmental Group; Erik Hansen and Irv Jenkins of Shell via telephone; and me, an alternative approach to conducting the RI/FS was proposed to DEQ. The proposed approach was to conduct risk assessment activities to focus on appropriate receptors prior to conducting site characterization activities. DEQ expressed concern that this approach would not adequately or appropriately determine the risks to human health and the environment.

While DEQ recognizes and accepts RI/FS streamlining efforts that are consistent with applicable legal agreements and Oregon cleanup laws and rules, DEQ does not agree with this proposed approach as it does not satisfy the requirements of the Consent Order Scope of Work (DEQ No. WMCSR-NWR-94-06) nor the requirements and intent of the 1995 Oregon Revised Environmental Cleanup Law (ORS 465) and corresponding rules (OAR 340-122).

John A. Kitzhaber  
Governor



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DEQ has previously expressed concerns with delays of the RI/FS process at the Willbridge facilities and continues to have concerns with further unnecessary delays in implementing the RI/FS. As such, DEQ requests that an RI/FS Work Plan consistent with the requirements of the Consent Order Scope of Work, and Oregon Revised Environmental Cleanup Law and Rules be submitted to DEQ prior to September 19, 1997. If an RI/FS Work Plan is not submitted in accordance with these requirements by this date, DEQ intends to initiate enforcement actions under the Consent Order. In accordance with the Consent Order, Section 7.L., DEQ will regard the failure to submit a good faith draft work plan as a violation subject to stipulated penalties.

Please feel free to call me at 503-229-6900 if you should have any questions on this matter.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Lance Geselbracht, Pacific Environmental Group  
Kevin Freeman, Pacific Environmental Group  
Dave St. Louis, DEQ/NWR  
Mavis Kent, DEQ/NWR  
Kurt Burkholder/DOJ



November 5, 1997

DEPARTMENT OF  
ENVIRONMENTAL  
QUALITY

NORTHWEST REGION

Rene White  
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Irv Jenkins  
Shell Oil Products Company  
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Martin Cramer  
TOSCO Corporation  
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Lance Geselbracht, P.E.  
Pacific Environmental Group  
7320 SW Hunziker Street, Suite 320  
Portland, Oregon 97223

Eric Conard  
GATX Terminals Corporation  
P.O. Box 83479  
Portland, OR 97283

RE: Willbridge Bulk Fuel Facilities  
Approval of Interim Action

Gentlemen:

DEQ is pleased to provide approval of the proposed interim action to address hydrocarbon seepage into the Willamette River. The proposed interim action involves the installation of a barrier wall at the 60-inch Doane Avenue storm drain as documented in the following report, *Barrier Wall Installation Design Report, Doane Avenue 60-Inch Storm Sewer Line, Willbridge Facility*, dated October 14, 1997, submitted to DEQ by Pacific Environmental Group, Inc.; and subsequent letter addressing DEQ comments, "Finalization of Barrier Design Report, Doane Avenue 60-Inch Storm Sewer Line, Willbridge Facility", dated October 31, 1997, submitted to DEQ by Pacific Environmental Group, Inc. The proposed interim action is to be conducted under authority of Section 5.D. of the existing Consent Order, DEQ No. WMCSR-NWR-94-06.

As DEQ has previously advised, approval of this interim remedial action does not preclude DEQ from selecting other or additional remedial measures as part of the final remedy for this site. Additionally, the implementation of this interim remedial action does not release the respondents from their obligations of completing a remedial investigation at the site to determine the nature and extent of contamination, identify migration pathways, and evaluate the risks to human health and the environment.

John A. Kitzhaber  
Governor



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November 5, 1997

Page 2

DEQ will not accept any delays with the initiation or conductance of the remedial investigation as a result of the implementation of this interim remedial action.

Please submit a copy of the final design drawings to DEQ for our files. In addition, please notify Jill Kiernan of my staff at least 5 working days in advance of initiation of construction activities. If you should have any questions regarding this matter, please feel free to call Jill Kiernan, Project Manager, at 503-229-6900 or Dave St. Louis at 503-229-5532.

Sincerely,

A handwritten signature in cursive script, appearing to read "Tom Bispham".

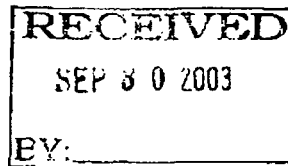
Tom Bispham, Administrator  
Northwest Region

cc: Nanci Snyder, City of Portland/BES  
Kevin Freeman, Pacific Environmental Group  
Dave St. Louis, DEQ/NWR  
Mavis Kent, DEQ/NWR  
Project File

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**Oregon**  
Theodore Kulongoski, Governor



**Department of Environmental Quality**  
Northwest Region Portland Office  
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September 22, 2003

Kelly Kline  
Delta Environmental Consultants, Inc.  
7150 SW Hampton, Suite 220  
Tigard, OR 97223

Re: DEQ Comments on Preliminary Source Control Evaluation for the Willbridge Facility

Dear Kelly:

DEQ has completed our review of the document, "Preliminary Source Control Evaluation", for the Willbridge Facility in Portland, Oregon, prepared by KHM Environmental Management, Inc. and dated April 24, 2003. Our comments on the document are listed below:

1. Section 1.0. This section identified overland transport, such as stormwater discharges and bank erosion, as part of this source control evaluation. However, there was no discussion in the document regarding any evaluation of overland transport. The revised source control evaluation report should include a discussion of the evaluation of overland transport.
2. Section 2.3.1. The construction completion report for the cutoff wall at the 60-inch storm water sewer outfall should be provided to DEQ. This section should describe the performance monitoring for the cutoff wall that is currently being conducted such as monitoring well locations, parameters, and frequency. In addition, this section should discuss, based on the performance monitoring, the effectiveness of the cutoff wall in preventing migration of both the separate-phase hydrocarbons (SPH) and dissolved-phase contamination into the Willamette River. A detailed map showing locations of the cutoff wall, the extraction wells, and the radius influence should also be provided.
3. Section 2.3.2. The schedule for design and construction of the proposed second cutoff wall should be included. The schedule should identify design report submittals [i.e. preliminary design (30%), pre-final design (90%), and final design (100%)] and include DEQ review and approval of those design documents.
4. Section 2.4. The evaluation criteria should also include the water quality criteria specified in OAR 340, Division 40, Table 20. The freshwater acute and freshwater chronic criteria for protection of aquatic life, and the fish consumption criteria for protection of human health are the applicable criteria from this table.
5. Section 2.5, Tables 1 through 4. It would be useful to include on the tables, the analytical method detection limits for the constituents listed as non-detects. Also, it would be useful to

shade or otherwise indicate those detections of constituents that exceed their respective screening criteria.

6. Section 2.5.2. The data from monitoring well, B-35, on the ConocoPhillips site indicate that benzene concentrations exceed both the ecological and human health screening (DEQ) criteria. Ethylbenzene, toluene, and total xylene concentrations in this well also exceed their respective ecological screening criteria. Monitoring well, B-7, on the Chevron site had prior detections of toluene and total xylene above the ecological screening criteria. Similarly, monitoring well, MW-37, on the Kinder Morgan site had prior detections of benzene above their respective human health (DEQ) and ecological screening criteria. Please revise this section to more accurately describe the analytical data results comparison to screening levels. Analysis of the data should also include trends in concentration with both time and location. Concentration vs. time plots and contaminant isopleths maps are useful for this purpose. Alternatively, statistical methods for trend analysis should be considered.
7. Section 2.5.3, Table 2. Conclusions in this section cannot be supported using a single sampling event from 1998. Table 2 should include additional monitoring data collected since 1997 or be deleted with the data incorporated into Table 3.
8. Section 2.5.4. Additional data collection and analysis are needed to better support the conclusions stated for the ConocoPhillips and Kinder Morgan facilities regarding concentrations of PAHs in groundwater do not appear to be an issue that warrant further assessment related to source control. Since the analytical method report limits for nine of the PAHs exceed the lowest screening criteria, the data set is somewhat limited for comparison to screening criteria. Groundwater samples from near-shore wells need to be analyzed using the low-level PAH SIM analyses. For the ConocoPhillips site, this includes monitoring well, B-36. Once a sufficient data set is generated, the data for all PAHs can be more appropriately compared to the screening criteria. Analysis of the data should also include trends in concentration with both time and location. Concentration vs. time plots and contaminant isopleths maps are useful for this purpose. Alternatively, statistical methods for trend analysis should be considered.
9. Section 2.5.5. Additional discussion and evaluation should be provided to support the conclusion that total metals in groundwater may be attributable to background concentrations. The DEQ-approved Remedial Investigation Work Plan identified arsenic, barium, chromium, and lead as hazardous constituents in storage tank bottom sludges and other materials that historically may have been disposed at all three facilities at the site. The historic, on-site disposal of these materials represents a potential source of the metals found in soils and groundwater at the site.
10. Section 3.0. DEQ acknowledges that seep sampling was performed in April and July 2003 and the results have been provided in the Revised Remedial Investigation Report. Results of the seep sampling should also be included in the revised source control evaluation report.

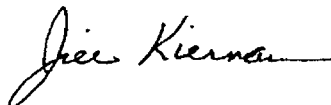


Continue semi-annual monitoring for seep occurrences and sampling of any observed seeps. A sampling and analysis plan for the seeps should be developed and provided to DEQ.

11. Section 3.0. DEQ is concerned about the migration of dissolved-phase contaminants in groundwater (BTEX, PAH, and metals) from groundwater to surface water above human health and ecological water quality criteria and screening values. The conclusions in the Preliminary Source Control Evaluation that the dissolved-phase migration has been addressed by the recently installed cutoff wall at the storm sewer outfall, or will be addressed by the proposed cutoff at the Chevron facility have not been supported by any data provided to DEQ. DEQ requests that further evaluation of the dissolved-phase migration and contribution of groundwater contaminants to surface water be performed. A proposal for this evaluation should be included in the revised source control evaluation report.

Please revise the Preliminary Source Control Evaluation document to address the above comments and submit for DEQ review. Please feel free to call me at 503-229-6900 if you should have any questions regarding these comments.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Anna Coates, DEQ  
Jim Anderson, DEQ  
Eric Conard, Kinder Morgan  
Steve Osborn, Kinder Morgan  
Marty Cramer, ConocoPhillips  
Gerald O'Regan, Chevron Texaco  
Frank Fossati, Shell Oil Products  
Gerald Koschal, PNG Environmental





# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
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June 2, 1999

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Eric Conard  
GATX Tank Storage Terminals  
Corporation  
P.O. Box 9007  
Long Beach, CA 90810-0007

Irv Jenkins  
Shell Oil Products Company  
777 Walker Street  
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TOSCO Corporation  
5528 Northwest Doane Avenue  
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Ron Schwab  
Unocal Corporation  
Diversified Businesses  
376 S. Valencia Avenue  
Brea, CA 92823

RE: Willbridge Bulk Fuel Facilities  
Request for Data and Quarterly Groundwater Monitoring Progress Reports

Gentlemen:

This letter is written to advise you of DEQ's unsuccessful attempts to obtain data from Pacific Environmental Group (PEG) on the recent sediment sampling event and the Geoprobe investigation along Front Avenue. Since January 1999, both Henning Larsen, with DEQ NW Region's Underground Storage Tank Program, and I have verbally requested this data on several occasions from PEG staff. As of the date of this letter, no data has been received.

This letter is a formal, written request for data under the terms of the Consent Order, No. WMCSR-NWR-94-06, Subsection 7(E)(1). Please provide all raw data, associated QA/QC memoranda, field notes, and laboratory analytical reports for (1) the Willamette River surface water and sediment sampling events conducted by PEG between September 1, 1998, and January 30, 1999; and (2) the soil and groundwater samples from the Geoprobe investigations conducted along Front Avenue by PEG between November 1, 1998, and April 30, 1999. Under the terms of the Consent Order, this requested information should be submitted to DEQ within 10 days. DEQ



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should receive this requested information by June 15, 1999. Failure to submit this requested information may result in the issuance of stipulated penalties under Subsection 7(L) of the Consent Order.

On another matter, Subsection 7(F) of the Consent Order requires the submittal of quarterly progress reports, which are to include groundwater monitoring results. As of the date of this letter, the progress reports for the fourth quarter of 1998 (September through November 1998) and the first quarter of 1999 (December 1998 through February 1999) have not been received by DEQ. Please submit these progress reports to DEQ by June 15, 1999. Failure to submit these reports may also result in the issuance of stipulated penalties under Subsection 7(L) of the Consent Order.

Subsection 7(F) of the Consent Order establishes a schedule for the submittal of these progress reports based on the issuance date of the Consent Order. These reports are to be submitted by the 15<sup>th</sup> day of the third month of the quarter. However, DEQ recognizes that additional time is required for lab analytical work, and for data analysis, interpretation, and management. Therefore, DEQ has established that the progress reports be due on the 15<sup>th</sup> of the second month following the end of the reporting period. The schedule for subsequent quarterly reports for 1999 is as follows:

Second Quarter (March to May 1999)	Due 7/15/99
Third Quarter (June to August 1999)	Due 10/15/99
Fourth Quarter (September to November 1999)	Due 1/15/00

If you should have any questions regarding these matters, please feel free to call me at 503-229-6900.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc: Kelly Kline/PEG  
Dave St. Louis/DEQ  
Henning Larsen/DEQ  
Mike Rosen/DEQ  
Kurt Burkholder/DOJ



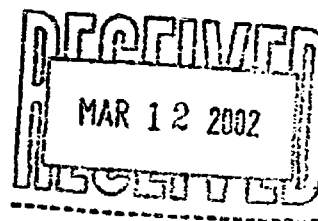
# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
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March 8, 2002



Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232

RE: Willbridge Bulk Fuel Facilities  
DEQ Comments on the Draft Remedial Investigation Report

Dear Kelly:

Enclosed are DEQ's comments on the report, *Draft Remedial Investigation Report, Willbridge Facility, Portland, Oregon*, submitted by KHM Environmental Management, Inc. and dated December 2000. Overall, DEQ was disappointed with the quality and content of the report as reflected in the attached comments and does not believe that the document satisfies the reporting requirements as specified in the Remedial Investigation/Feasibility Study Scope of Work attachment to the Consent Order. The document fails to provide a sufficient level of technical detail and discussion as expected in remedial investigation, human health risk assessment, and ecological risk assessment reports. Conclusions regarding nature and extent of contamination, fate and transport of contamination, and environmental impacts and risks to human health and the environment are lacking, incomplete, or largely unsupported. As such, DEQ believes that the report, in its current state, is inadequate as supporting documentation for agency decisions regarding the need for and scope of remedial actions at the site.

DEQ requests that a written response be submitted by April 8, 2002, describing how each of the comments will be addressed. The response should also include a proposed schedule for submittal of a revised document and completing any additional work required to address data gaps. DEQ also requests a meeting, approximately 2 weeks after submittal of the response to comments, to discuss the comments and responses, and direction for completing the remedial investigation and risk assessments.



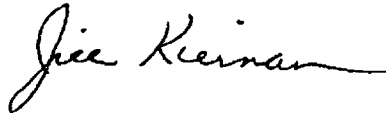
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COPPOR00012576



As always, please feel free to call me at 503-229-6900 if you should have any questions regarding these comments.

Sincerely,

A handwritten signature in cursive script, reading "Jill Kiernan".

Jill Kiernan, P.E.  
Senior Project Engineer

cc w/encl: Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Gerry Koschal, PNG Environmental  
John Foxwell, Hart Crowser  
John Wegrzyn, DEQ  
Jennifer Peterson, DEQ  
Anna Coates, DEQ

cc: Dave St. Louis, DEQ  
Eric Blischke, DEQ

## DEQ COMMENTS ON REMEDIAL INVESTIGATION REPORT

### WILLBRIDGE FACILITY

#### GENERAL COMMENTS

1. The tables and figures providing analytical data should be proofread for completeness and accuracy. DEQ noted numerous omissions and errors in these tables and figures, some of which are listed in the specific comments below. Additionally, the tables providing analytical results should include the analytical detection limits for the non-detect laboratory parameters.
2. Contaminant fate and transport needs to be better defined and described, particularly with regard to contaminant migration from groundwater to the Willamette River and from the fill/alluvium to the lower basalt unit, and migration onto off-site properties. This discussion should also address hydraulic influences on contaminant migration as a result of pumping of the Chevron Asphalt well.
3. The Consent Order initially defined the boundaries of the investigation as extending into the river up to 50 feet from the ordinary high water mark or 100 feet from the stormwater outfalls, however, it also stated that the boundaries may be modified based upon results of the remedial investigation. In accordance with the definition of "locality of the facility" (LOF) defined by OAR 340-122-0115(34), the LOF means any point where a human or ecological receptor contacts, or is reasonably likely to come into contact with facility-related hazardous substances. Based on a review of the initial findings of the remedial investigation and the identification of potential human and ecological receptors that may come into contact with site contaminants, the definition of locality of the facility for the Willbridge site may need to be modified to include additional areas, in particular portions of the Willamette River beyond the 50-foot boundary. Although the lateral extent to which site contaminants are migrating out into the Willamette River has not been completely defined, the potential for human or ecological receptors to come into contact with site contaminants in the river beyond the 50-foot boundary appears likely. As such, an apparent data gap for this Remedial Investigation is defining the extent to which site contaminants are migrating into the Willamette River. If contaminants are migrating beyond the 50-foot boundary or 100-foot boundary at the outfalls, then potential risks to human and ecological receptors need to be assessed.
4. The analytical results of groundwater samples collected from the off-site wells should be provided in both the data summary tables and Appendix C.
5. Analytical results from the seep sampling conducted at the Kinder Morgan facility subsequent to DEQ's site visit on September 5, 2001, should be provided in this report.

## SPECIFIC COMMENTS

6. Section 2.0. The description of the site setting and features is difficult to follow because of inadequate figures. Figures should be revised and additional figures added to adequately depict:
  - Details of the existing natural waterways and storm sewers, including the location of the 60-inch storm sewer outfall;
  - Location of the former 27-inch sewer;
  - Saltzman Creek, including the concrete-lined channel and the unlined expanse;
  - The confluence of Saltzman Creek and the Willamette River;
  - Current topography;
  - Historic topography, especially former waterways including Doane Lake, Kittridge Lake, and Holbrook Slough;
  - Zoning;
7. Section 2.2., page 4. The statement that "wind data is not available for the site region" is not accurate. Wind data should be added and referenced.
8. Section 2.3.1. A zoning map of the site and surrounding area should be included and referenced in the text. Each zoning type applicable to the site should be defined. Note that the site is within the River Industrial Greenway Overlay, a designation that includes the goal of "preserving and enhancing the riparian habitat".
9. Section 2.3.2. This section is difficult to follow without figures. The development sequence of the site is complex. Locations of the features described should be shown on figures and in relation to the current facility features to be meaningful.
10. Section 2.3.4. This section downplays the importance of the Willamette River land uses. The statement that "heavy industrial use of the Willbridge area is the only future foreseeable land use" ignores the importance of the riparian habitat. Saltzman Creek and its confluence with the Willamette River are not discussed. A paragraph describing current and reasonably likely ecological and recreational land uses should be included.
11. Section 2.4. The description of natural resources within the locality of the facility is inadequate. Again, the importance of the Willamette River is downplayed. Saltzman Creek is not mentioned. The greenbelt along the Willamette River is significant and should be described in detail. The exposure pathway from the site to the migratory fish species cannot be discounted. It is unclear from the text if a wetlands habitat exists at the site. See Comment #31 regarding ecological habitat.
12. Section 2.4.1. It appears, from the generic description provided, that a site survey was not performed. However, a Level 1 Ecological Scoping Evaluation was apparently performed as part of the ecological risk assessment. The results of this scoping evaluation should be incorporated into this section.

13. Section 2.4.2. A reference to the source(s) of the animal species listed should be provided. Again, it appears that a site survey was not performed. The list of bird species is notably incomplete. Sparrows, wrens, thrushes, and other common varieties of birds undoubtedly occupy the riverside habitat. The list of small mammals also appears to be incomplete. The results of the ecological scoping evaluation should be incorporated into this section.
14. Section 2.4.3. This section provides a generic description of common area fish species, however, no site-specific information is provided. There is no discussion of invertebrate aquatic species. The results of the ecological scoping evaluation should be incorporated into this section.
15. Section 2.4.3. A figure of the locations of the wetlands in the locality of the facility should be provided. It appears from the description, that portions of the site may be wetlands. A separate expanded section describing historic and current wetlands should be provided as a new Section 2.4.4. This information should also be incorporated into the Ecological Risk Assessment, Section 8.2 and Appendix F.
16. Section 3.0. This section is difficult to follow because of the lack of figures that adequately show the features that are described. Historic disposal locations, oil/water separators, tanks, manholes, and other features should be shown on site figures. In addition, a legible figure showing the sewers, the storm drain system, and numbered outfalls should be provided. Figure 37, the Utility Map, is difficult to read and does not show many of the features described in the text.
17. Section 3.0. A paragraph summarizing the sanitary and storm sewer permits should be provided. Additionally, a brief description of the hazardous waste generator status and the waste streams produced should be included.
18. Section 3.1, Tables 1, 2, and 3. The units are missing from the Spills Summary Tables.
19. Section 3.1.1.3 and Table 1. This section and table should be updated to include the more recent Chevron spills: the 3260 gallon Techron spill on 9/12/00, and the 481 gallon gasoline spill on 3/6/01. The discussion in the text should describe any cleanup actions taken in response to the spills.
20. Section 3.1.2.5, page 18. The second paragraph references Appendix D for the location of analytical results. However, Appendix D does not include these data.
21. Section 3.1.3.4 and Table 3. This section and table should be updated to include the following spills at the Tosco facility: the 2500 gallon lube oil spill on 12/19/97; the 6538 gallon kerosene spill on 6/15/00; the 55 gallon marine diesel oil spill on 12/21/00; and the 25 gallon marine diesel fuel spill on 6/21/01. The discussion in the text should describe any cleanup actions taken in response to the spills.

22. Section 3.2. Metals should be added to the discussion of contaminants of concern. The source of the metals should also be described.
23. Section 3.3.3. Figures of the historic and current SPH plume should be added. The locations of historic and current petroleum product seepage into the Willamette River must be identified. Based on the laboratory results it appears that there may be four or more SPH plumes. Figure 7, the Separate Phase Hydrocarbon Map, does not show the lateral extent of the SPHs.
24. Section 4.1. The discussion of the tank bottom sludges should include a description of the contaminants that are typically associated with the sludges.
25. Section 4.2. This section should be revised to include the more recent Chevron and Tosco spills described in Comments #19 and 21.
26. Section 4.3.1. This section should identify and describe the enclosed surface structures into which vapor phase contaminants could migrate (i.e., buildings, sewers, vaults, confined spaces, etc.).
27. Section 4.3.2. A description of any history of soil excavation, grading, or filling with the potential to transport impacted surface soils should be provided.
28. Section 4.3.3. The locations of the water supply wells on the Chevron Asphalt Plant and Air Liquide property should be shown on a map.
29. Section 4.3.3. The influence on the vertical hydraulic gradient and subsequent contaminant migration due to pumping of the Chevron Asphalt well needs to be better defined and discussed. Any existing pump test data and chemical analysis for this well should be provided.
30. Sections 4.0 and 4.4., and Figure 4, Conceptual Site Model. The Conceptual Site Model (CSM) provided in Figure 4 has been modified from the CSM provided in the DEQ-approved RI Work Plan. Sufficient justification should be provided for these modifications.

During a DEQ site visit on September 5, 2001, DEQ observed or became aware of other potential receptors and exposure pathways that should be addressed. These included observations of landscape workers in the riparian/greenway areas potentially being exposed to contaminated soils, and the use of the Chevron waterfront area for small boat launching and fishing by site workers and a special interest group. An apparent hydrocarbon seepage area was also observed by DEQ along the shoreline just upstream of the Kinder Morgan dock. Additionally, based on the delineation of the locality of the facility (Figure 2) it appears that potential exposures to off-site workers on adjacent properties should be specifically addressed. Based on DEQ's observations and understanding of the site, the following receptors/exposure routes/pathways must be included in the CSM, (in addition to those already identified in Figure 4):

- a. On-Site Workers: Complete exposure pathways should be identified for site workers for ingestion of surface soils; inhalation of vapors from both subsurface soils and groundwater (indoor workers); and dermal contact with surface water, sediment, and SPH seeps.
  - b. Trench Workers: Complete exposure pathways should be identified for trench workers for ingestion and dermal contact of surface soils. Although the primary exposures to this receptor are from subsurface soils and groundwater, trench workers could be exposed to contaminated surface soils that are excavated, managed, and backfilled as part of the maintenance or utility work.
  - c. Recreation River Users: Complete exposure pathways should be identified for this receptor for dermal contact of groundwater and SPH seeps, surface water, and sediment. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for ingestion of surface water and sediments.
  - d. Trespassers: Complete exposure pathways should be identified for this receptor for ingestion and dermal contact of surface soils, and dermal contact with SPH seeps. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for inhalation of fugitive dust, and dermal contact and ingestion of surface water and sediments.
  - e. Off-site Workers: Off-site workers should be identified as a receptor with complete exposure pathways identified for dermal contact with groundwater (SPH seeps); and inhalation of vapors from subsurface soils and groundwater. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for inhalation of fugitive dust, and dermal contact and ingestion of surface water and sediments.
  - f. Landscape Workers: Landscape workers should be identified as receptors with complete exposure pathways identified for ingestion and dermal contact with surface soils, subsurface soils, groundwater (SPH seeps); and inhalation of fugitive dust. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for inhalation of vapors from subsurface soils and groundwater; and dermal contact and ingestion of surface water and sediments.
31. Sections 4.0 and 4.5.1, and Figure 4. DEQ disagrees with the statement that there is no significant terrestrial habitat at the site. During the DEQ site visit on September 5, 2000, DEQ observed noteworthy terrestrial habitat along the lower reach of the Saltzman Creek area and the greenway area to the northwest of the Kinder Morgan dock. This habitat consisted of a combination of sand beach frontage; tangles of blackberry; mixes of a few shrubs, forbs, grasses, and thistle. Kildeer were noted foraging along the beach front and family of nutria were observed occupying the upland

vegetation. Numerous rodent tracks and signs of use by a variety of other avian and mammal species were also evident. Additionally, Kinder Morgan is engaged in installing a significant number of plantings that will add further botanical diversity to the area and serve to enhance attraction of various wildlife species.

Based on DEQ's observations the following ecological receptors/exposure routes/pathways must be included in the CSM, (in addition to those already identified in Figure 4):

- a. **Aquatic Ecological:** Complete exposure pathways should be identified for these receptors for ingestion and dermal contact of surface soils. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for these receptors for inhalation of fugitive dust; ingestion and dermal contact with subsurface soils; and inhalation of vapors from subsurface soils and groundwater.
  - b. **Terrestrial Species:** Complete exposure pathways should be identified for these receptors for ingestion and dermal contact of surface soils, subsurface soils, groundwater and SPH seeps. Undetermined exposure pathways due to insufficient data to confirm or eliminate the exposure pathway should be identified for these receptors for inhalation of fugitive dust; inhalation of vapors from subsurface soils and groundwater; and ingestion and dermal contact with surface water and sediments.
32. Section 4.0 and Figure 4. In the CSM, for those exposure routes identified as undetermined due to insufficient data with which to confirm or eliminate the exposure pathway, the text should identify and discuss how these particular data gaps will be addressed.
  33. Section 5.3.1.3. The purpose of the utility trench investigation should be stated. Also, in Figure 37, the cross-section inserts are unreadable. A more legible copy of this figure should be provided in the revised report.
  34. Section 5.3.2. A discussion and interpretation of the results of the Holbrook Slough investigation should be provided, either in this section or in a subsection to Section 6.0. The discussion of the results should address each of the four stated objectives of the investigation as listed in the first paragraph in Section 5.3.2. Appendix D does not adequately provide an interpretation or discussion of the results of this study.
  35. Section 5.5. This section should identify and describe the two spills that were used in the hot spot analysis, i.e., the 500 gallon jet fuel spill on 10/19/96 at the GATX facility and the 11,700 gallon gasoline spill on 2/22/99 at the Tosco facility.
  36. Section 6.2.2. A figure should be provided showing locations of the geotechnical borings. In addition, the boring logs used in the geologic interpretation should be provided either in an appendix or referenced (i.e., Appendix E of the Remedial

Investigation Work Plan). Geologic cross-sections of the site hydrogeology should also be provided.

37. Section 6.3.2. The discussion of the horizontal gradient should be expanded to include source of the data for determining the gradient of 0.007 ft/ft. A map of the area hydrology showing the Saltzman Creek watershed and the 500-year floodplain in relation to the site should be provided.
38. Section 6.4.2. Geologic cross-sections of the site should be provided showing site stratigraphy, the water bearing units, and laterally continuous site layer described in the text.
39. Section 6.4.2. This section states that the basalt is likely hydraulically connected to the fill and alluvium units. This relationship should be quantified. Is the vertical gradient upward or downward? Do contaminants migrate from the overlying fill and alluvium into the underlying basalt? What testing has been done to establish this relationship?
40. Section 6.4.2.2. Contaminant migration via groundwater discharge to the Willamette River from both preferential pathways and seepage/discharge should be further defined and discussed. A estimate of the flux and contaminant loading should be provided.
41. Sections 6.5 through 6.8. Tables 8 through 32 should include analytical detection limits for the non-detect laboratory parameters.
42. Section 6.5.1. The last sentence of the second paragraph states that cumulative gauging and analytical results from 1995 to the present for the RI wells are included in Appendix A. However, Appendix A only contains the gauging data.
43. Sections 6.5.1.2 through 6.5.1.7, and Sections 6.5.2.1 through 6.5.2.6. The discussions regarding the comparison of analytical results to PRGs and subsequent screening of COCs should be deleted from these subsections. Although the R9PRGs may be appropriate screening values for use in human health risk assessment, the R9PRGs are not appropriate for determining COCs for the ecological risk assessment. The discussions comparing analytical data to screening values and determining COCs are more appropriate for the Human Health and Ecological Risk Assessments (Appendices E and F).
44. Section 6.5.1.7. The text states that total and dissolved arsenic concentrations ranged from not detected to 69 ppb. However, the analytical results from well B-37, as provided in the data summary table, had a total arsenic concentrations of up to 228 ppb. Similarly, the text states that the maximum total or dissolved copper concentration was 86 ppb. However, the analytical results from well B-28 had a total copper concentration of up to 242 ppb. Also, the text states that the maximum total or dissolved chromium concentration was 98.2 ppb. The analytical data from well B-30 show a concentration of total chromium of up to 128 ppb. The text should be appropriately revised.



45. Section 6.5.2, Figure 23. The units for the analytical results listed should be  $\mu\text{g/L}$  and not  $\text{mg/L}$  as shown. Also, the sample results listed for benzene at TOS-HP-1 should be  $78.1 \mu\text{g/L}$ , and not  $18.5$ .
46. Section 6.6. The reference to Section 5.7 in the first paragraph should be to Section 6.7.
47. Sections 6.6.1 through 6.6.5. The use of industrial soil R9PRGs for evaluating whether a risk to the environment or human health exists due to exposure to contaminated sediments is inappropriate. The discussions in these subsections regarding comparison of analytical data to these R9PRGs and subsequent screening of COCs should be deleted. The process of comparing analytical data to applicable screening values and determining COCs should be more appropriately conducted as part of the Human Health and Ecological Risk Assessments (Appendices E and F).
48. Sections 6.7.1 through 6.7.3. The use of the tap water R9PRGs for evaluating whether there are risks to ecological receptors due to exposure to contaminated surface water is inappropriate. The discussions in these subsections regarding comparison of analytical data to these R9PRGs and subsequent screening of COCs should be deleted.
49. Sections 6.8.1 through 6.8.6. The use of industrial soil R9PRGs for evaluating whether risks to ecological receptors due to exposure to contaminated soils is inappropriate. The discussions in these subsections regarding comparison of analytical data to these R9PRGs and subsequent screening of COCs should be deleted. The process of comparing analytical data to applicable screening values and determining COCs should be more appropriately conducted as part of the Human Health and Ecological Risk Assessments (Appendices E and F).
50. Section 6.8. The reference for the HS sample results to Section 5.10 is incorrect. The reference should be to Section 9.2.2.
51. Section 6.8, Figure 25. The VOC results for the CHEV-SS-12 sample location should be listed. Also, the naphthalene results for this sample location should be corrected to read  $0.523 \text{ mg/kg}$  (Table 28a).
52. Section 6.8, Figure 27. The PAH results listed for sample location TOS-SS-10 are not consistent with those provided in Table 28a.
53. Section 6.8, Figure 28. The BTEX results for sample location CHEV-RF-3(4) should be listed in this figure.
54. Section 6.8, Figure 29. The sample results listed for location GATX-HP-2 should be obtained from the vadose zone (i.e., the 4 ft depth) results and not from the results at the 20 ft depth.
55. Section 6.8, Figure 30. The PAH results listed for sample location TOS-RF-2(8) are not consistent with those provided in Table 28b.

56. Section 6.8.4, Table 30a. Why are there no VOC analytical results listed for surface soil samples at the GATX facility? A minimum of 5 surface soil samples from the GATX should have been collected for VOC analysis per requirements of the DEQ-approved Remedial Investigation Work Plan (Table 4-2). If surface samples were not collected for VOC analysis, then this appears to be a data gap.
57. Section 6.8, Figure 31. The BTEX results listed for sample location CHEV-HP-1(12) are incorrectly shown as non-detects. Table 27b shows a result of 0.147 ppm for xylene at this location.
58. Section 6.8, Figure 32. The BTEX results listed for sample location GATX-HP-11(8) are incorrectly shown as non-detects. Table 27b shows detections of ethylbenzene, toluene, and xylene for this sample location.
59. Section 6.8, Figure 33. Some of the sample locations show results from a gasoline analysis. Where are the corresponding data tables for these samples?

The PAH results listed for sample location TOS-HP-2(20) are incorrectly shown as non-detects. Table 28b shows detections for two of the PAHs for this sample location.

The PAH results listed for sample location TOS-HP-5(10) are not consistent with those provided in Table 28b.

At sample location TOS-RF-2 the depth listed should be 8 feet and not 11 feet.

60. Section 6.8, Figure 34. At sample location CHEV-RF-1(16), a detection of xylene is shown. However, Table 27b shows the BTEX analytical results as non-detects at this sample location. This discrepancy should be corrected.
61. Section 6.8, Figure 35. The PAH results listed for sample location GATX-HP-4(22) are not consistent with Tables 28b and 29b.
62. Section 6.8.5, page 64. The inference that arsenic concentrations found in soils at the site are comparable to naturally occurring background levels should be supported by actual data, either obtained from a background location at the site or from other cleanup sites in the area where background levels of arsenic have been determined.
63. Section 6.8, Tables 23, 27c, 28b, 29b, 31a, 31b. The zero values listed in these tables should be corrected to read actual values. In Tables 31a and 31b some of the sample dates are incomplete. In Table 28c, the analytical results for many of the PAHs are missing from the table.
64. Section 7.1. The locality of the facility should consider all water bearing zones and surface water bodies that are currently or reasonably likely to be affected. Consequently, a discussion of the Columbia River Basalt aquifer should be added.

65. Section 7.1, page 68. Figure 2 should be labeled to include those features described in defining the locality of the facility.
66. Section 7.1. Additional discussion and rationale should be provided for defining the locality of the facility on a portion of the McCall Oil Co. and Chevron Asphalt sites. What wells/data were used? Also, the groundwater monitoring data for the Chevron Asphalt well should be provided in a data summary table and in Appendix C.
67. Sections 7.3.4 and 7.4.5. DEQ disagrees with the statement that Saltzman Creek has little value as ecological habitat (see Comment #31). These sections will likely need to be revised based on comments on the Ecological Risk Assessment Report (Appendix F).
68. Section 8.0 This section will need to be revised appropriately to incorporate revisions to the Human Health Risk Assessment and Ecological Risk Assessment Reports to address DEQ comments.
69. Section 8.0. The second paragraph states that exposure to residents living off-site, recreational river users, and trespassers were considered to be less significant than exposure to an on-site worker; and therefore these receptors were not evaluated quantitatively in the HHRA. Although it may be true that residents living off-site and trespassers on the site would have less exposures than an on-site worker, the comparison does not hold true for recreational user since they would be exposed to different site media than a worker. The evaluation of exposure pathways for the on-site worker did not consider surface water and sediment and thus the risks due to exposure to these media were not evaluated. Recreational river users are considered to be likely scenario according to the conceptual site model, and the risk assessment should characterize the risks. If adequate surface water data are not available, groundwater concentrations (modeled and/or unmodeled) are recommended to assess the risk to recreational river users. The assessment should consider current and future exposure concentrations.
70. Section 8.1. The discussion of the results of the risk assessment should be consistent with OAR 340-122-0115(1), which is the definition of acceptable risk levels. The results presented throughout this section should be reported as below or above DEQ's acceptable risk level of  $1 \times 10^{-6}$  for exposure to individual carcinogens and as below or above DEQ's acceptable risk level of  $1 \times 10^{-5}$  for exposure to multiple carcinogens. For noncarcinogens, results should be reported as equal to or below DEQ's target hazard index of one, or above DEQ's target hazard index of one.
71. Section 9.0. Additional hot spots may be identified pending revisions to the Human Health and Ecological Risk Assessments. This section will likely require revisions to account for changes to the risk assessments.

72. Section 9.1. The hot spot analysis for groundwater and surface water must be revised to fully evaluate all significant adverse effects on beneficial uses of water or waters to which hazardous substances would be reasonably likely to migrate. The definition of "significant adverse effect on beneficial uses of water", as defined by OAR-340-122-115(50), includes current or reasonably likely future exceedance of applicable or relevant federal, state or local water quality standards, criteria, or guidance. This analysis was not performed as part of the hot spot evaluation and must be included to address not only the comparison of applicable surface water standards and criteria to actual surface water quality data, but also the comparison of these standards and criteria to the SPH and dissolved-phase contaminant concentrations migrating from groundwater to surface water.
73. Section 9.1. The statement that there is currently no impairment to the beneficial use of the existing Chevron Asphalt production well should be supported by data. Additionally, the statement that no impairment of the identified beneficial uses of groundwater associated with the bulk oil terminals is expected in the future should be also be further supported (see Comments #29 and 39). A better understanding of the hydraulic connection and vertical gradient between the fill/alluvium units and the underlying basalt and the potential for downward contaminant migration into the basalt unit under both non-pumping and pumping conditions needs to be established and supported by data.
74. Section 9.2.2. A detailed discussion of the results of the surrogate hot spot analysis for the two spill areas should be provided.
75. Section 10.2. This section will need to be revised appropriately to incorporate revisions to the Human Health Risk Assessment and Ecological Risk Assessment Reports to address DEQ comments.
76. Section 10.2. The second paragraph states that there were no exposure pathways identified for the indoor worker. However, Section 1.4.3 of Appendix E identifies inhalation of vapors derived from groundwater (indoor worker only) as a major exposure pathway quantified in the baseline HHRA. Thus, the statement in this section should be appropriately revised to reflect exposures evaluated in the risk assessment.
77. Section 10.2. This section fails to discuss the noncarcinogenic risk results for the outdoor worker (soil), trench worker (soil and groundwater). Please revise accordingly.
78. Section 10.2. The ninth paragraph states that concentrations of petroleum hydrocarbons in the environment posed an unacceptable risk to site workers in surface soil in a small area of the GATX terminal and to trench workers in groundwater. Describe the specific locations for these areas. A map showing the locations of these areas should also be provided.

## APPENDIX A

79. Appendix A, Table A-1. At several well locations the SPH thickness is listed as a negative number. Please explain what the negative number means.

## APPENDIX E: HUMAN HEALTH RISK ASSESSMENT REPORT

80. Appendix E. Risk calculations are unable to be regenerated with the information provided. CPHCs identified in the risk assessment should be carried through the risk assessment with the final risks presented in the risk characterization section. For example, the list of chemicals for surface soil exposure point concentrations at the Chevron Facility, presented in Table 1-3, should be presented in the risk characterization with their respective risks. Risks should be presented for each exposure pathway, multiple pathways for each chemical, and the total risk for each scenario. Revised risk calculation tables should be submitted to DEQ for approval prior to resubmitting the revised report. Electronic spreadsheets with risk calculations are preferred.
81. Appendix E. The risk assessment does not consider industrial use of groundwater given that it is a reasonable likely future beneficial water use as identified in Section 7.3.5 of the RI Report. The risk assessment should be appropriately revised to evaluate potential risks from exposures due to the identified reasonably likely future industrial uses of groundwater.
82. Appendix E. Exposure units should be clearly defined for the site. It appears that three sites (Chevron, Tosco and GATX) within the Willbridge facility are being characterized as separate soil exposure units. This characterization is appropriate if workers are solely employed by one of the three exposure units, and will spend their entire work day within the confines of Chevron, Tosco or GATX. However, it is unclear if there are additional exposure units (areas) that are part of the Willbridge locality of the facility, that are within Chevron, Tosco and GATX site boundaries. Additionally, groundwater exposure units were evaluated on a well by well basis. It may be more representative of actual exposure to cluster the data in some reasonable manner (i.e., two, three, or four wells together).
83. Appendix E. For each distinct exposure unit, soil and well data should be evaluated together for the contaminant screening procedures. Currently, soil data is analyzed by exposure unit, and the groundwater data is evaluated by individual well. Screening for each unit should follow the contaminant screening procedures as described in the *Guidance for Conduct of Deterministic Human Health Risk Assessments*, DEQ 1998, for contaminants of interest. Based on this guidance, (Section 2.3.2), "screening must take into consideration the potential risk to be posed by exposure to: a) individual COIs, (b) multiple COIs simultaneously within a given medium (cumulative risk per OAR 340-122-084(1)(i)), and (c) individual or multiple COIs within different media". A table following the format of Table 1 (DEQ, 1998) should be included for each unit,

showing which chemicals are screened in for one media and multiple media and the individual and cumulative risk of each.

84. Appendix E. The human health risk assessment should state if a contaminant plume is present and if so, its potential sources. A discussion on off-site contaminant migration should be provided. Identify groundwater areas (i.e., clusters of wells) with risks greater than acceptable risk levels.
85. Appendix E. Background soils and groundwater data are recommended for identifying the metals of potential concern. (Section 1.4.1). DEQ suggests the use of WADOE Clark County soil background values for inorganics or use of background data from other cleanup sites in the area. Alternatively, site-specific values can be used.
86. Appendix E. The risk assessment should qualitatively discuss the results of TPH analysis in soil and groundwater.
87. Appendix E. A map should be provided showing the locations of fences for each of the facilities. This figure should provide the justification for not considering the site trespasser scenario.
88. Appendix E. The trench worker scenario should consider surface soil and subsurface soil data. It is assumed that a worker has to contact the surface soil in order to reach deeper soils. Depths of surface soil and subsurface soil should be clearly described in the risk assessment.
89. Appendix E. Xylene was found in the subsurface soils and groundwater on the Tosco Facility at elevated concentrations. The exposure point concentration found in Table 1-3 indicates that xylenes might be present in free phase. A hazard quotient should be calculated for this chemical of concern.
90. Appendix E. A map showing all soil sampling locations identified in Table 1-3 should be provided. Include property boundaries, roads, buildings, storage tanks, fences, and surface water bodies. Also, a map showing the groundwater sampling locations provided in Table 1-4 should be provided. Include property boundaries, roads, buildings, storage tanks, fences, and surface water bodies. Additionally, a table listing all groundwater, surface soil and subsurface soil sampling locations used in the risk assessment should be provided.
91. Appendix E. Provide chemical-specific parameters used in the risk calculations. This includes all toxicological data used for modeling dermal and inhalation exposures (missing  $t^*$ ,  $K_p$ ,  $\tau$ ,  $B$ ).
92. Appendix E. It appears that dermal risk from polynuclear aromatic hydrocarbons (PAHs) found in soil and groundwater were not evaluated for reasons provided in the RI Work Plan. Although these reasons are valid, DEQ typically recommends a standard assessment approach for assessing dermal risk from PAHs in the risk characterization

section. It is appropriate to discuss this uncertainty in the uncertainty section including the risk levels if dermal risk is not considered for PAHs.

93. Appendix E, Section 1.0. References to regulatory guidance used to conduct the risk assessment should be provided.
94. Appendix E, Section 1.2. The conceptual site model should be revised to include additional receptors and pathways as per Comment #30. Also, in reference to the CSM in Figure 4, the text describes open circles indicating minor exposure pathways. However, there are no open circles included in this figure.
95. Appendix E, Section 1.3. Data used in the contaminant screen process and subsequent calculation of the exposure point concentrations for each chemical and media should be presented or appropriately referenced. This section should include additional discussion on the following: data sources used in the risk assessment; deviations from the sampling and analysis plan which may have resulted in data limitations; evaluation of all qualifiers and codes associated with the data set; evaluation of blank samples relative to the data set; whether or not data quality objectives were met; and whether sampling included appropriate QA/QC measures (e.g., replicate samples, split samples, trip and field blanks, etc). Describe what was included in the "partial" data validation for RI fieldwork data. Also describe the data validation that was performed on a limited amount of groundwater monitoring data collected before the RI. Define the depths of surface soil and subsurface soil used in the data set for this risk assessment. Clarify if the groundwater data used for metals was for total or dissolved metals.
96. Appendix E, Section 1.3. Appendix E. This section states, "Reporting limits for some samples were elevated because of dilutions or matrix interference. Consequently, some reporting limits for chemicals that were not detected exceed risk-based screening concentrations." A list of analytes per media that had elevated reporting limits should be provided. Referring to Tables 1-1 and 1-2, it appears that there were a significant amount of samples that contained elevated detection limits above a screening concentration.
97. Appendix E, Section 1.3. Identify the locations where bis(2-ethylhexyl)phthalate was detected in groundwater samples and the respective concentrations. Discuss the field and lab blank data as it relates to the detection of bis(2-ethylhexyl)phthalate. Discuss any results from splits collected on data with detected concentrations of bis(2-ethylhexyl)phthalate.
98. Appendix E, Section 1.4.1, Tables 1-1 and 1-2. Contaminants that have a maximum detection limit that is greater than the screening value should not be screened out, but identified as a CPHC.
99. Appendix E, Section 1.4.1. A discussion on how contaminants that have no screening value will be addressed in the risk assessment should be provided.

100. Appendix E, Section 1.4.1, Table 1-1. For surface soils at the GATX facility, the maximum lead concentration shown is not consistent with the corresponding data summary table (Table 31a). What is the source of the surface soil metals data provided in this table? For subsurface soils at the all three facilities, the VOC and BTEX concentrations shown are not consistent with the corresponding summary tables. Again, what is the source of the subsurface soil VOC and BTEX data that is provided in the table?
101. Appendix E, Section 1.4.1, Table 1-2. The data presented for chromium and lead in this table are not consistent with the corresponding summary tables (Tables 11a and 11b). What is the source of the metals data provided in this table?
102. Appendix E, Section 1.4.2. Potential exposures to recreational river users were not evaluated under the current conceptual site model as presented. However, based on DEQ's observations at the site (see Comment #30) there may some exposures to recreational river users. The facility docks and equipment do not completely prevent access to the waterfront or river near the site; the area around the mouth of Saltzman Creek would be readily accessible. Additionally, receptors could be exposed to site contaminants in the area of the Chevron waterfront that is being used for small boat launching and fishing. These potential exposures to recreational river users should be further evaluated in the risk assessment.

Additional information should be provided to support the statement that exposure to contaminants that potentially migrate from the site to downstream parts of the Willamette River where recreational use may be possible is expected to be insignificant.

103. Appendix E, Section 1.4.2. Additional receptors that should be identified and further evaluated in the risk assessment include off-site workers and landscape workers. (See Comment #30).
104. Appendix E, Section 1.4.3. Inhalation of volatiles from soils into indoor air and outdoor air should be considered major exposure pathways for both on-site and off-site workers and evaluated quantitatively in the baseline risk assessment. Risks from these pathways should be combined with risks from other pathways for both the indoor worker and outdoor worker to determine the total cumulative risk to these receptors. Volatile organics were detected at concentrations that exceeded screening values in some areas. In addition to screening values for toxicity, some of these concentrations (e.g. benzene) exceed DEQ's occupational RBCs for volatilization from soil to indoor and outdoor air by several orders of magnitude (*Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites*, DEQ, 1999).
105. Appendix E, Section 1.4.3. Additional pathways should be identified and further evaluated in the risk assessment as per Comment #30.
106. Appendix E, Section 1.4.5.1. Please identify the data set(s) that were used to calculate soil, groundwater, and volatilization to outdoor air exposure point concentrations



(EPCs) for the trench worker exposure scenario. Data from samples collected in the rights-of-way and utility corridors should have been used as representative data for calculating EPCs for this receptor.

107. Appendix E, Section 1.4.5.1. EPCs will likely need to be calculated for surface water, sediment, and SPH to address the additional pathways identified. The EPCs for indoor air must also consider volatilization from soils and SPH.
108. Appendix E, Section 1.4.5.1, Table 1-3. The RME EPCs for benzene, naphthalene, and toluene are less than their respective average scenario EPCs. For example at the Tosco facility, subsurface soil RME EPC is 1.59 mg/kg and the average EPC is 5.05 mg/kg. Explain how the RME concentrations were generated. Data sets should be tested for normality and the RME should be generated using the correct equation for normal or lognormal distributions based on EPA (1992) guidance. Please explain or correct this data discrepancy.
109. Appendix E, Section 1.4.5.1, Groundwater. According to OAR-340-122-084 (1)(f), the RME is defined as 90<sup>th</sup> percentile upper confidence limit on the arithmetic mean of the concentrations of hazardous substances. The exposure point concentration calculations in the risk assessment applied an arithmetic mean concentration if more than one result was available at a location from 1997 to 1999. Thus, this approach is inconsistent with the administrative rules. Calculations for the EPCs should be revised to be consistent with the administrative rules. Accordingly, more recent groundwater data (2000 and 2001) should be included in the data set for the risk assessment.
110. Appendix E, Section 1.4.5.1, Vapors in Outdoor Air. EPCs that were calculated for the outdoor air should be summarized in tabular form.
111. Appendix E, Section 1.4.5.1, Vapors in Indoor Air. Since conditions varied by well, all parameters used in the model (groundwater concentration, depth to groundwater, liquid phase concentration, etc.) should be identified and described for each well (Table 1-5).
112. Appendix E, Section 1.4.5.1, Vapors in Indoor Air. The data set(s) used for the groundwater depths in the model should be identified. How were seasonal variations in groundwater levels taken into account when determining depths to groundwater?
113. Appendix E, Section 1.4.5.1, Vapors in Indoor Air. This type of model is very sensitive to building area. For this analysis, an average of all building sizes across the site was used. However, this may be inappropriate if building sizes encompass a wide range. A map and listing of the buildings present in each exposure unit, their dimensions including height, location, and a description of building use should be provided.
114. Appendix E, Section 1.4.5.1, Vapors in Indoor Air. A discussion of the model sensitivity should be provided.

115. Appendix E, Section 1.4.5.1, Vapors in Indoor Air. It should also be noted that DEQ has established risk-based concentrations for chemical volatilization from soil and groundwater to indoor and outdoor air for many of the contaminants detected at the Willbridge facility, which can be found in the document "*Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites*", (DEQ, 1999). At some locations, exposure point concentrations exceed DEQ's occupational RBCs for volatilization from soils and groundwater to indoor and outdoor air by several orders of magnitude.
116. Appendix E, Section 1.4.5.2, Table 1-11. Define and provide sources for  $t^*$ , B, and tau. Refer to a table with chemical-specific values.
117. Appendix E, Section 1.4.5.2, Tables 1-13 and 1-14. Please define and provide a value for the "K" factor in the equations.
118. Appendix E, Section 1.5. A subsection should be added to discuss the possible health effects for contaminants that do not have an EPA toxicity value. Chemicals that were detected at the site but not evaluated due to the absence of a toxicity value should be identified.
119. Appendix E, Section 1.5.1.3. DEQ typically applies oral toxicity values as surrogates for dermal toxicity values, not applying the gastrointestinal absorption factors to the oral toxicity value. It is recommended to revise the dermal exposure pathway calculations using oral toxicity values in place of oral-adjusted values.
120. Appendix E, Section 1.6. The results presented throughout this section should be reported as below or above DEQ's acceptable risk level of  $1 \times 10^{-6}$  for exposure to individual carcinogens and as below or above DEQ's acceptable risk level of  $1 \times 10^{-5}$  for exposure to multiple carcinogens. For noncarcinogens, results should be reported as equal to or below DEQ's target hazard index of one, or above DEQ's target hazard index of one. Also, summary tables should be provided for each receptor showing risks per pathway (i.e., dermal, inhalation, ingestion).
121. Appendix E, Tables 1-4 and 1-20. Table 1-20 shows that at location Chev RF-3 there is an unacceptable risk for bis(2-ethylhexyl)phthalate. However, Table 1-4 does not provide the EPC for this contaminant at this location. This discrepancy should be resolved.
122. Appendix E, Section 1.7. The text states that an analysis of uncertainties associated with the contaminant screening and evaluation, toxicity assessment, exposure assessment, and risk characterization sections is presented separately within each section of the baseline HHRA. However, analysis and discussion of uncertainty was not presented within each sections of the risk assessment (Appendix E). Section 1.7 of Appendix E should be revised to describe the uncertainties that effect the risk characterization and include separate discussions for each of the four phases of the risk assessment process (i.e., data evaluation, exposure assessment, toxicity assessment, and

risk characterization). Each uncertainty should be described by the potential direction (e.g., over or under estimation of risk) that might result from the uncertainty. The data evaluation section should (1) identify any problems with the sample design which might result in a lack of full site characterization, and (2) discuss the possible consequences of including or excluding data from the HHRA. The exposure assessment section should list and summarize key model assumptions and indicate the potential impacts of each risk. The toxicity assessment should discuss the effect of any CPHCs that lack toxicity values, and therefore cannot be evaluated quantitatively. Toxicity information from other sources can also be evaluated for use in the uncertainty assessment for those chemicals lacking toxicity factors.

#### APPENDIX F: ECOLOGICAL RISK ASSESSMENT REPORT

123. Appendix F. The document format and conceptual approach appears generally consistent with the appropriate format for ecological risk assessments. However, the presentation of the text for the ecological risk assessment is lacking. Data relied upon for the risk screening comparisons are difficult to locate. References to work performed are vague and difficult to locate and verify, and a number of tables appear to be missing. The overall quality of the work product appears to be inadequate for sufficiently screening the site for ecological risks; especially that portion of the site associated with the riparian area adjacent to the Willamette River. The document requires significant revisions to clarify and improve the presentation of these risk comparisons to determine if the environment is adequately protected.
124. Appendix F, Section 2.1.4. The second paragraph states that the facility does not contain any terrestrial habitat. However, based on a DEQ site visit to the facility conducted on September 5, 2001, it is evident that noteworthy terrestrial habitat generally exists in what would be expected to be the locality of the facility (LOF) north of the pier extending to Saltzman Creek and westerly from the river bank ranging from 15 to 50 m or more shoreward. This habitat consists of a combination of sand beach frontage, tangles of blackberry; mixes of a few shrubs, forbs, grasses, and thistle. Killdeer were noted foraging along the beach front and a family of nutria were observed occupying the upland vegetation. Numerous rodent tracks and signs of use by a variety of other avian and mammal species also were evident. Additionally, Kinder-Morgan is engaged in installing a significant number of plantings that will add further botanical diversity to the area and serve to enhance attraction of various wildlife species. This section should be appropriately revised to reflect these conditions.
125. Appendix F, Section 2.2.3. The first paragraph states that the site does not contain any ecological features and no significant vegetation exists. While this appears true for the primary industrial areas of the site, the site with respect to cleanup consists of the entire LOF. Noteworthy habitats exist within the LOF in conjunction with the easterly terrestrial aspects of the site; particularly along the northern boundary of the site associated with the lower reach of Saltzman Creek to its confluence with the Willamette River. Therefore, the site, i.e. the LOF, is not currently 100% ruderal as stated in the text.

126. Appendix F, Section 2.2.5. This section states, "Contamination at the site is in surface and subsurface soil and groundwater. Ecological receptors do not have significant exposure to surface and subsurface soil". DEQ does not agree with this statement. On the contrary, ecological receptors likely are exposed to soil wherever they terrestrially forage or seek cover. That the soil to which they are exposed contains or does not contain environmental contaminants is a separate issue. However, there can be no issue taken that ecological receptors are, in fact, exposed to surface and subsurface soils. Further, since a number of seeps were observed by DEQ staff to be clearly discharging to the surface environment on the beach frontage, and from the apparent sheen present in conjunction with these, the seeps are also likely discharging environmental contaminants to surface soils and ultimately to the river. The potential for exposure of ecological receptors to environmental contaminants from the seeps in both terrestrial and aquatic environments associated with the LOF of the site is clearly evident. This section should be revised to evaluate and discuss potential risks to the ecological receptor from exposure to the contaminated surface and subsurface soils and seeps.

127. Appendix F, Section 3.1.3.3. The text states, "... some surface soil contamination may be transported to the river run-off during storm events. These sources may contaminate surface water and sediment in the Willamette River, which may lead to exposure of aquatic ecological receptors and wildlife that utilize the river corridor." In deference to this statement all exposure pathways for both aquatic and terrestrial receptors identified in Figure 4 Conceptual Site Model, for the surface soil source term are considered to be "N," incomplete or insignificant exposure pathway. This classification conflicts with the statement in the text and does not appear to adequately reflect potential exposure pathways at the site.

In fact, based on recent drought conditions over the past two years it is apparent that all exposure pathways for both terrestrial and aquatic receptors potentially influenced by contamination entering the Willamette River and the available riparian corridor should be re-evaluated for exposure and reassessed for adverse risk. Screening should be conducted on a reasonably worst case scenario pursuant to DEQ Level II ERA guidance.

Re-evaluate potential exposure of both terrestrial and aquatic receptors from all potential pathways that could adversely impact the Willamette River and the riparian habitats. Revise Figure 4, and the document text as appropriate.

128. Appendix F, Section 3.3.1. The text states, "The only site-specific receptors observed utilizing the Willamette River next to the Willbridge facility during site visits were the mallard ducks and Canada geese." Ecological signs observed at the site during the visit conducted by DEQ staff in early September indicate that the list of receptors reported in the document appears to be inadequate for that portion of the terrestrial environment consisting of the riparian zone adjacent to the river. A family of nutria, tracks of various species of burrowing mammals, tracks and fecal signs of various species of birds, as well as invertebrate species all were observed in the upland terrestrial environment adjacent to the river. It appears that the description of ecological resources associated

with the upland riparian area associated with the site is inadequate and should be revised.

129. Appendix F, Section 3.3.1. In the second paragraph part of the text states, "... site-related exposure of wildlife to site-related contaminated media in the aquatic environmental is limited and expected to be minimal, especially given the large home ranges and foraging areas for these species." This statement is inadequately supported within the document. Additional discussion should be provided to support this statement.
130. Appendix F, Section 3.3.2. The stated endpoints address only the benthic community associated with the Willamette River and migratory fish populations. State and federal listed threatened and endangered species are not addressed. Assessment of risks to federal and state listed threatened and endangered species are required by Oregon statutes at the individual organism level of ecological organization.

Further, DEQ disagrees that screening levels based on bioaccumulation afford any significant degree of protection to wildlife species, particularly listed threatened and endangered species. The ecological risk assessment must be revised to address these issues.

131. Appendix F, Section 3.3.3. Although the approved Remedial Investigation Work Plan allowed for the use of the Lower Columbia River Dredged Material Evaluation Framework (DMEF) values as sediment benchmarks for screening contaminants of potential concern, the Work Plan also required that the bioaccumulating contaminants not be screened but carried through the risk assessment. Consequently, PAHs should not have been screened out but evaluated further in the risk assessment.

The report should be revised to adequately consider all contaminants that are potentially relevant for freshwater sediment by ensuring that adequate data sets exist for all contaminant-containing abiotic matrices including air, soil, surface water, and ground water. DEQ guidance should be followed with additional input from DEQ toxicologists on adequately handling bioaccumulative contaminants.

132. Appendix F, Section 3.3.3. Tables 1-1, 1-2, and 1-3 are missing from this report and should be provided to support the results of the screening process.
133. Appendix F, Section 3.3.3, Sediment. Sample data, statistics, and screening comparisons for the DDT and related samples could not be located to verify the validity and adequacy of the screening comparisons. This is especially important since DDT and related compounds are potentially bioaccumulative. The report should be revised to include supporting documentation for the screening comparisons.
134. Appendix F, Section 3.3.3, Surface Water. Sample data, statistics, and screening comparisons for fluorene and phenanthrene and related samples could not be located based on the information provided in the text to verify the validity and adequacy of the

screening comparisons. Revise the report to clearly provide the location of appropriate tables and reference the location data, statistics, and other information necessary for DEQ to validate the screening risk comparisons.

135. Appendix F, Section 3.4. The second paragraph states that DEQ does not consider PAHs to be bioaccumulative. Current scientific literature clearly demonstrates that some PAHs may exhibit bioaccumulative effects. Additionally, the report does not adequately justify through the content of the text that the screening evaluation indicates that the potential for ecological effects from site-related contamination is minimal and that the conclusions that no further ecological investigations of the Willamette River are necessary at the Willbridge facility. This section should be appropriately revised.



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region

2020 SW Fourth Avenue

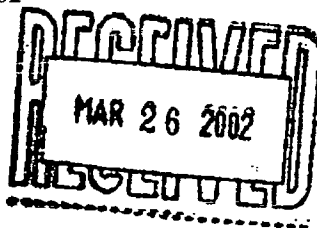
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March 22, 2002



Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232, Inc.

RE: Willbridge Bulk Fuels Facility  
City Permit Waivers for Cleanup Actions

Dear Kelly:

This letter is intended to reiterate our previous discussions in November 2001 regarding permit waivers for the proposed cleanup action at the Tosco Willbridge facility located at 5528 NW Doane Avenue in Portland. The proposed cleanup action involved the installation of a cutoff wall around a 60-inch storm sewer to mitigate contaminant seepage into the Willamette River. Design plans for this cleanup action have been submitted to and approved by DEQ. This cleanup action is being conducted as a removal action pursuant to the Order on Consent, No. WMCSR-NWR-94-06, issued by DEQ.

For cleanup actions that have been approved by DEQ, the Environmental Cleanup Statutes, specifically ORS 465.315(3), provide a waiver from state and local permits with the condition that the substantive requirements of the permits are met. Accordingly, since the proposed construction of a cutoff wall is a cleanup action approved by DEQ, local permits, such as the City of Portland Site Development permit, are waived for this action. However, DEQ expects that the substantive requirements of the local permits will be met by the responsible parties during the construction of the cutoff wall.

Additional information regarding the permit waiver provision of ORS 465.315 can be found in a guidance document on DEQ's web site located at <http://www.deq.state.or.us/wmc/documents/permxfn.doc>.

Please feel free to call me at 503-229-6900 if you should have any questions regarding this permit waiver provision or the project.

Sincerely,

Jill Kieman, P.E.  
Senior Project Engineer

cc : Marty Cramer, Tosco



DEQ-1

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# Oregon

John A. Kitzhaber, M.D., Governor

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DEC 27 2002

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December 19, 2002

Kelly Kline  
KHM Environmental Management, Inc.  
7150 SW Hampton, Suite 220  
Tigard, Oregon 97223

RE: Willbridge Bulk Fuel Facilities

Dear Kelly:

DEQ is providing this written response to your letter of October 2, 2002, documenting major issues discussed during our meeting on September 17, 2002. Your letter requested that DEQ provide a written response to your letter of August 15, 2002, responding to DEQ comments on the draft Remedial Investigation Report, and acknowledge the proposed Willbridge Terminal Group's (WTG) management approach for completion of the uplands remedial investigation work and the performance of a source control evaluation.

#### Management Approach for Uplands Remedial Investigation and Source Control Evaluation

DEQ is in general agreement with the WTG approach to separately manage the uplands and in-water work. It is DEQ's understanding that in-water investigations, risk assessments, and remediation for Willamette River surface water and sediments at the Willbridge facilities will be performed under the Portland Harbor CERCLA process with EPA as the lead oversight agency. DEQ would expect that the CERCLA in-water work address all requirements of the current DEQ Consent Order (#WMCSR-NWR-94-06) for the Willbridge site related to characterization of Willamette River surface water and sediments, and the evaluation of remedial alternatives for these impacted media.

The uplands remedial investigations, risk assessments, and feasibility study will be completed under the current DEQ Consent Order. The uplands remedial investigation must include the evaluation of contaminant migration pathways with a focus on pathways that may result in hazardous substance releases to the Willamette River. The uplands risk assessments should evaluate risks to those upland human and ecological receptors likely exposed to site contaminants in soils, groundwater, upland surface water, and air. In addition, due to EPA concerns that contaminant seeps from upland sites are not adequately being evaluated, the uplands risk assessments should also evaluate exposures to hydrocarbon seeps at the river by upland human and ecological receptors.



DEQ-1

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In addition, DEQ has requested that the WTG perform a source control evaluation under the current DEQ Consent Order for the Willbridge site. The source control evaluation may be performed independently of the uplands remedial investigation and risk assessments. The source control evaluation should assess potential impacts of upland contamination on in-water human and ecological receptors for purposes of evaluating, designing and implementing source control measures. The source control evaluation should focus on groundwater discharges, separate-phase hydrocarbon (SPH) seeps, and overland transport such stormwater discharges or bank erosion, as potential sources of contamination to the Willamette River.

In general, the approach for determining the need for source control measures will be based on whether these site contaminant discharges represent a current or reasonably likely future adverse effect on beneficial uses of the Willamette River as measured by exceedences of applicable standards, criteria, and guidance. Further evaluation of contaminant releases involving additional characterization of surface water or sediments, or site-specific risk assessment may also be necessary to adequately assess impacts to the Willamette River.

#### Comment Response Letter

DEQ would like to provide clarification on the following comment responses as provided in the August 15, 2002 letter:

Responses #3, 11, 14, 69, 102, 126, 127, 128, 129, 130, and 134: DEQ generally agrees with this approach. It should also be recognized that potential impacts of upland soils, groundwater, upland surface water contamination, and SPH seeps on in-water receptors must be evaluated for purposes of evaluating, designing, and implementing source control measures. This evaluation can include use of existing standards, criteria, and guidance. In the absence of such numeric standards, a more risk-based approach may be necessary.

Responses #30, 94, 103, 105, and revised Conceptual Site Model (CSM): The risk assessments must evaluate exposures to hydrocarbon seeps at the river by upland human and ecological receptors. Specifically, exposures to hydrocarbon seeps by on-site workers and landscape workers should be evaluated.

Conceptual Site Model (Attachments A & B): Based on Figure 37 of the Draft Remedial Investigation Report, two storm sewers and one sanitary sewer are at elevations below the water table. As such utility workers are likely to be exposed to contaminants in groundwater. The CSM should identify groundwater ingestion, vapor inhalation, and dermal contact as potential exposure pathways for the utility workers. Subsequently, the baseline human health risk assessment should evaluate these exposure scenarios as appropriate.

Responses #31, 123, 126, 127, 128, and revised Conceptual Site Model: Terrestrial habitat is present along the lower reach of Saltzman Creek and the greenway area northwest of the Kinder-Morgan dock. Upland ecological receptors (e.g. shorebirds, waterfowl, small mammals) with the potential to be exposed to site contaminants in upland soils and seeps should be included in the CSM. Complete exposure pathways should be identified for terrestrial species for ingestion and dermal contact with surface and subsurface soils and SPH seeps. The ecological risk assessment should evaluate these exposure scenarios as appropriate.

Response #40. It wasn't clear from the response if DEQ's initial request for an estimate of contaminant flux and contaminant loading will be provided. DEQ would expect that this information be provided in the revised RI Report as groundwater discharges to the Willamette River represent a key contaminant migration pathway. Also, information regarding the interim remedial action measures at the 60-inch storm sewer have been submitted to DEQ in the form of pre-construction design plans. It was DEQ's understanding that a Construction Completion Report would be submitted to DEQ documenting as-built construction of the barrier wall. Performance of the IRAM should continue to be reported in the semi-annual groundwater monitoring reports.

Responses #71 and #72. It should be recognized that by using the approach to separately managing the upland and in-water work, the hot spot evaluation can only be partially completed at this time since the human health and ecological risk assessments will be limited to the evaluation of the upland exposure scenarios. Additional evaluation of hot spots at the site may be required upon completion of the Portland Harbor RI/FS work to satisfy requirements of OAR 340-122-0080(6) and (7), and 340-122-0085(4)(c), (5), (6), and (7).

Responses #82 and #84. The statements regarding averaging COPC concentrations over each exposure unit are inconsistent with OAR 340-122-0084(1)(f) that requires exposure point concentrations be based on the 90<sup>th</sup> percentile upper confidence limit on the mean.

Response #107. Exposure point concentrations (EPCs) will likely need to be calculated for the SPH seeps.

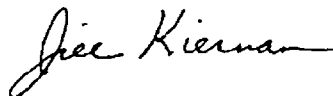
Response #126. It is not clear from the response if exposures to subsurface soils by ecological receptors will be addressed. The RI defined surface soils as the upper 6 inches of soil. However, ecological receptors could be exposed to contaminated soils below this depth. (to depths of 1 m).

Response #135. Upland contaminants with the potential to bioaccumulate must be given special consideration when evaluating the need for source control measures.

Kelly Kline  
December 19, 2002  
Page 4

Please provide a schedule for submittal of the source control evaluation proposal and revised Remedial Investigation Report. Please feel free to call me at 503-229-6900 if you should have any questions regarding the project.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc : Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Gerry Koschal, PNG Environmental  
John Foxwell, GeoEngineers  
Eric Blischke, DEQ  
Anna Coates, DEQ



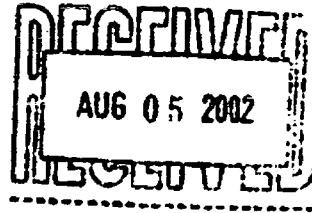
# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

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July 31, 2002



Kelly Kline  
KHM Environmental Management, Inc.  
7150 SW Hampton, Suite 220  
Tigard, Oregon 97223

RE: Willbridge Bulk Fuel Facilities  
DEQ Approval of Revised Schedule for Changes to the RI Report

Dear Kelly:

DEQ has reviewed the revised schedule for changes to the Remedial Investigation (RI) Report as submitted by letter from KHM Environmental Management, Inc. on July 18, 2002. DEQ is pleased to provide approval of this revised schedule.

Available days for the meeting with DEQ staff include September 16, 17, and 18, 2002. Please let me know what day and time works best for all of the parties involved.

Please feel free to call me at 503-229-6900 if you should have any questions regarding the project.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

cc : Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Gerry Koschal, PNG Environmental  
John Foxwell, GeoEngineers  
Jennifer Peterson, DEQ  
Anna Coates, DEQ



DEQ-1

COPPOR00012604



# Oregon

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## Department of Environmental Quality

Northwest Region

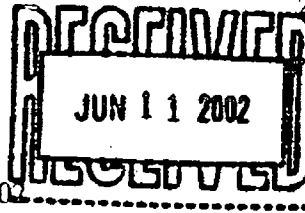
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(503) 229-5263 Voice

TTY (503) 229-5471



June 5, 2002

Kelly Kline  
KHM Environmental Management  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232

RE: Willbridge Bulk Fuel Facilities  
DEQ Comments on Proposed Schedule for Revising the RI Report

Dear Kelly:

DEQ has reviewed the proposed schedule for revising the Remedial Investigation (RI) Report as submitted by letter from KHM Environmental Management on May 20, 2002. DEQ is in agreement with the overall schedule and the proposed date for submittal of the revised RI Report. However, DEQ still requests that a written response to DEQ's comments of March 8, 2002, be submitted describing how each of the comments will be addressed. The written response should be submitted at a minimum of 2 weeks prior to any meeting with DEQ to allow for DEQ review and internal discussions of the responses.

DEQ also notes that the schedule shows substantial completion of the endangerment assessment (Item 13) and completion of revisions to the non-endangerment assessment related text (Item 14) prior to the scheduled meeting with DEQ to discuss the comments and responses. Completion of these tasks prior to discussion with DEQ on the comments and responses does not allow any time for resolution of issues or disagreements that may arise. The schedule should be modified to include time for issue resolution and incorporation into the endangerment assessment and RI text as necessary.

The purpose of the second DEQ meeting (Item 20) should be stated. If the purpose is to present results of the revised RI and endangerment assessment, DEQ would prefer that such a meeting be deferred until 45 days after the submittal of the revised report to allow for DEQ review.



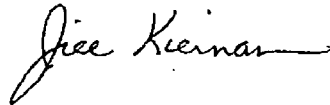
DEQ-1

COPPOR00012605

Kelly Kline  
June 5, 2002  
Page 2

Please revise the proposed schedule accordingly to address these comments and resubmit for DEQ review. Please feel free to call me at 503-229-6900 if you should have any questions regarding these comments.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc : Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Gerry Koschal, PNG Environmental  
John Foxwell, GeoEngineers  
John Wegrzyn, DEQ  
Jennifer Peterson, DEQ  
Anna Coates, DEQ  
Dave St. Louis, DEQ



# Oregon

John A. Kitzhaber, M.D., Governor

**Department of Environmental Quality**

Northwest Region

2020 SW Fourth Avenue

Suite 400

Portland, OR 97201-4987

(503) 229-5263 Voice

(503) 229-5471

December 19, 2002

**RECEIVED**  
DEC 23 2002

Kelly Kline  
KHM Environmental Management, Inc.  
7150 SW Hampton, Suite 220  
Tigard, Oregon 97223

RE: Willbridge Bulk Fuel Facilities

Dear Kelly:

DEQ is providing this written response to your letter of October 2, 2002, documenting major issues discussed during our meeting on September 17, 2002. Your letter requested that DEQ provide a written response to your letter of August 15, 2002, responding to DEQ comments on the draft Remedial Investigation Report, and acknowledge the proposed Willbridge Terminal Group's (WTG) management approach for completion of the uplands remedial investigation work and the performance of a source control evaluation.

Management Approach for Uplands Remedial Investigation and Source Control Evaluation

DEQ is in general agreement with the WTG approach to separately manage the uplands and in-water work. It is DEQ's understanding that in-water investigations, risk assessments, and remediation for Willamette River surface water and sediments at the Willbridge facilities will be performed under the Portland Harbor CERCLA process with EPA as the lead oversight agency. DEQ would expect that the CERCLA in-water work address all requirements of the current DEQ Consent Order (#WMCSR-NWR-94-06) for the Willbridge site related to characterization of Willamette River surface water and sediments, and the evaluation of remedial alternatives for these impacted media.

The uplands remedial investigations, risk assessments, and feasibility study will be completed under the current DEQ Consent Order. The uplands remedial investigation must include the evaluation of contaminant migration pathways with a focus on pathways that may result in hazardous substance releases to the Willamette River. The uplands risk assessments should evaluate risks to those upland human and ecological receptors likely exposed to site contaminants in soils, groundwater, upland surface water, and air. In addition, due to EPA concerns that contaminant seeps from upland sites are not adequately being evaluated, the uplands risk assessments should also evaluate exposures to hydrocarbon seeps at the river by upland human and ecological receptors.

DEQ-1

COPPOR00012607



Kelly Kline  
December 19, 2002  
Page 2

In addition, DEQ has requested that the WTG perform a source control evaluation under the current DEQ Consent Order for the Willbridge site. The source control evaluation may be performed independently of the uplands remedial investigation and risk assessments. The source control evaluation should assess potential impacts of upland contamination on in-water human and ecological receptors for purposes of evaluating, designing and implementing source control measures. The source control evaluation should focus on groundwater discharges, separate-phase hydrocarbon (SPH) seeps, and overland transport such as stormwater discharges or bank erosion, as potential sources of contamination to the Willamette River.

In general, the approach for determining the need for source control measures will be based on whether these site contaminant discharges represent a current or reasonably likely future adverse effect on beneficial uses of the Willamette River as measured by exceedences of applicable standards, criteria, and guidance. Further evaluation of contaminant releases involving additional characterization of surface water or sediments, or site-specific risk assessment may also be necessary to adequately assess impacts to the Willamette River.

#### Comment Response Letter

DEQ would like to provide clarification on the following comment responses as provided in the August 15, 2002 letter:

Responses #3, 11, 14, 69, 102, 126, 127, 128, 129, 130, and 134: DEQ generally agrees with this approach. It should also be recognized that potential impacts of upland soils, groundwater, upland surface water contamination, and SPH seeps on in-water receptors must be evaluated for purposes of evaluating, designing, and implementing source control measures. This evaluation can include use of existing standards, criteria, and guidance. In the absence of such numeric standards, a more risk-based approach may be necessary.

Responses #30, 94, 103, 105, and revised Conceptual Site Model (CSM): The risk assessments must evaluate exposures to hydrocarbon seeps at the river by upland human and ecological receptors. Specifically, exposures to hydrocarbon seeps by on-site workers and landscape workers should be evaluated.

Conceptual Site Model (Attachments A & B): Based on Figure 37 of the Draft Remedial Investigation Report, two storm sewers and one sanitary sewer are at elevations below the water table. As such utility workers are likely to be exposed to contaminants in groundwater. The CSM should identify groundwater ingestion, vapor inhalation, and dermal contact as potential exposure pathways for the utility workers. Subsequently, the baseline human health risk assessment should evaluate these exposure scenarios as appropriate.

Don't need to  
include.



Kelly Kline  
December 19, 2002  
Page 3

upland soils  
will be evaluated  
in Risk assessment

Responses #31, 123, 126, 127, 128, and revised Conceptual Site Model: Terrestrial habitat is present along the lower reach of Saltzman Creek and the greenway area northwest of the Kinder-Morgan dock. Upland ecological receptors (e.g. shorebirds, waterfowl, small mammals) with the potential to be exposed to site contaminants in upland soils and seeps should be included in the CSM. Complete exposure pathways should be identified for terrestrial species for ingestion and dermal contact with surface and subsurface soils and SPH seeps. The ecological risk assessment should evaluate these exposure scenarios as appropriate.

Response #40. It wasn't clear from the response if DEQ's initial request for an estimate of contaminant flux and contaminant loading will be provided. DEQ would expect that this information be provided in the revised RI Report as groundwater discharges to the Willamette River represent a key contaminant migration pathway. Also, information regarding the interim remedial action measures at the 60-inch storm sewer have been submitted to DEQ in the form of pre-construction design plans. It was DEQ's understanding that a Construction Completion Report would be submitted to DEQ documenting as-built construction of the barrier wall. Performance of the IRAM should continue to be reported in the semi-annual groundwater monitoring reports.

Responses #71 and #72. It should be recognized that by using the approach to separately managing the upland and in-water work, the hot spot evaluation can only be partially completed at this time since the human health and ecological risk assessments will be limited to the evaluation of the upland exposure scenarios. Additional evaluation of hot spots at the site may be required upon completion of the Portland Harbor RI/FS work to satisfy requirements of OAR 340-122-0080(6) and (7), and 340-122-0085(4)(c), (5), (6), and (7).

Responses #82 and #84. The statements regarding averaging COPC concentrations over each exposure unit are inconsistent with OAR 340-122-0084(1)(f) that requires exposure point concentrations be based on the 90<sup>th</sup> percentile upper confidence limit on the mean.

Response #107. Exposure point concentrations (EPCs) will likely need to be calculated for the SPH seeps.

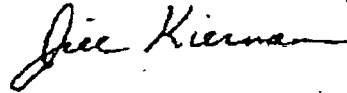
Response #126. It is not clear from the response if exposures to subsurface soils by ecological receptors will be addressed. The RI defined surface soils as the upper 6 inches of soil. However, ecological receptors could be exposed to contaminated soils below this depth. (to depths of 1 m).

Response #135. Upland contaminants with the potential to bioaccumulate must be given special consideration when evaluating the need for source control measures.

Kelly Kline  
December 19, 2002  
Page 4

Please provide a schedule for submittal of the source control evaluation proposal and revised Remedial Investigation Report. Please feel free to call me at 503-229-6900 if you should have any questions regarding the project.

Sincerely,



Jill Kiernan, P.E.  
Senior Project Engineer

cc : Marty Cramer, Tosco  
Gerald O'Regan, Chevron  
Frank Fossati, Shell  
Eric Conard, Kinder Morgan Energy Partners  
Ron Schwab, Unocal  
Gerry Koschal, PNG Environmental  
John Foxwell, GeoEngineers  
Eric Blischke, DEQ  
Anna Coates, DEQ



# KHM Processing / Filing Form

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Client Name: Willbridge Terminals Group  
Site Name: Willbridge Terminals  
Site Location: Portland OR  
Document Title: Letter to DEQ following the September 17, 2002 meeting

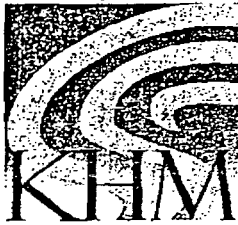
Document Type: ☒ Letter ☐ Report ☐ Memo ☐ Proposal ☐ Table  
☐ Form ☐ Contract ☐ Transmittal ☐ GWM Report ☐ Other

File Name and Network Subdirectory Containing Your Files: G:\Willbridge\B17-016 2002 RI Rewrite\  
Additional Instructions: Final Willbridge letter to DEQ following Sept 17 meeting

## Chain of Review:

PM/Reviewer:	Reviewer's	
	Initials	Date:
Project Manager:		
Principal:		
Professional Stamp:		
<u>Kelly Kline</u>		
<u>R. Scott Milk</u>	<u>RSM</u>	<u>10/02/2002</u>

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<u>Eric Bliskie - Hand Delivered (10/03/2002)</u>	<u>1</u>			<u>X</u>						
<u>Steve Osborne</u>	<u>1</u>			<u>X</u>	<u>X</u>					
<u>Marky Gramm</u>	<u>1</u>			<u>X</u>	<u>X</u>					
<u>Gerald O'Regan</u>	<u>1</u>			<u>X</u>	<u>X</u>					
<u>Frank Fassari</u>	<u>1</u>			<u>X</u>	<u>X</u>					
<u>Take Fuji</u>	<u>1</u>			<u>X</u>	<u>X</u>					
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ENVIRONMENTAL MANAGEMENT, INC.

COPY  
KHM copy

October 2, 2002  
Project B17-01G

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
Northwest Region Voluntary Cleanup Program  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201-4987

Dear Ms. Kiernan:

This letter is submitted on behalf of the Willbridge Terminals Group (WTG) and presents our understanding of the items discussed during our meeting on September 17, 2002 regarding the Draft Remedial Investigation Report (RI) for the Willbridge Terminals Group Site ("the site"). The WTG appreciates the time the Oregon Department of Environmental Quality (DEQ) project team spent meeting with us regarding the ongoing upland RI for the site. As we discussed in our meeting, the WTG has assigned a high priority to finalizing the upland RI.

The WTG provided a letter to the DEQ dated August 15, 2002 describing the manner in which each of the comments raised by the DEQ in their March 8, 2002 comment letter would be addressed. During our meeting, DEQ discussed several of the comment responses; however, the WTG has not received written approval from the DEQ regarding the comment responses. The WTG would like a written response/approval from the DEQ regarding our comment responses prior to initiating the revisions to the upland RI and the supporting risk assessment.

At this time, the WTG would like to summarize and document the major issues discussed during our meeting:

- 1) The DEQ is requesting a Source Control Evaluation to identify possible upland/surface water interactions and to identify possible receptors.
- 2) The WTG request DEQ's acknowledgement that the upland and in-water (sediment) issues will be managed separately. This is consistent with the manner in which other Remedial Investigation in the Portland Harbor Initial Study Area (ISA) are currently being conducted.

October 2, 2002

Page 3

cc: Mr. Eric Blischke, DEQ, Portland, Oregon  
Mr. Eric Conard, Kinder Morgan Energy Partners, Orange, California  
Mr. Steve Osborn, Kinder Morgan Energy Partners, Fairfield, California  
Mr. Marty Cramer, Phillips Petroleum Company, Portland, Oregon  
Mr. Gerald O'Regan, Chevron Oil Company, San Ramon, California  
Mr. Frank Fossati, Shell Oil Products US, Lake Forest, California  
Dr. Taku Fuji, Hart Crowser, Portland, Oregon  
Mr. Gerry Koschal, PNG Environmental, Tigard, Oregon

October 2, 2002

Page 2

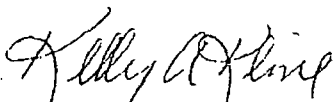
We believe that the future CERCLA cleanup activities, together with a source control evaluation, will provide an effective management structure for in-water issues. As indicated verbally in our meeting, the WTG is willing to develop a proposal for a source control evaluation. However, we must emphasize again our desire to complete the upland RI independently of the source control evaluation. Also, it is important to note that the need for source control has already been identified at two separate locations at the site, and mitigating actions are underway at both locations.

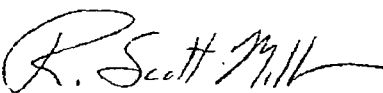
In order to begin making progress towards completing the upland RI, we propose/request the following items of the DEQ:

- 1) The WTG will prepare a source control evaluation proposal and submit it to the DEQ by December 1, 2002. As discussed during our September 17, 2002 meeting, many of the comments to the draft RI report, including Comment No. 3, may be more appropriately addressed in the framework of a source control evaluation.
- 2) DEQ to provide the WTG written acknowledgement that the upland and in-water (sediment) issues will be managed separately. The upland issues will be addressed under the existing consent order, with in-water issues being addressed under CERCLA process together with the source control evaluation.
- 3) The DEQ to provide written approval, with comment as applicable, to our comment responses letter dated August 15, 2002. Upon receiving approval from the DEQ, the WTG will move forward to finalize the upland RI and will provide a revised schedule to the DEQ for all project activities.

The WTG appreciates your assistance with this project and looks forward to the completion of the upland RI. The WTG also looks forward to receiving your responses to this letter. If you have any questions, please contact Kelly Kline or Scott Miller at KHM at 503/639-8098.

Sincerely,  
**KHM Environmental Management, Inc.**

  
Kelly Kline, R.G.  
Senior Geologist

  
R. Scott Miller, P.E.  
Principal Engineer



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[www.deltaenv.com](http://www.deltaenv.com)

7150 SW Hampton • Suite 220

Tigard, Oregon 97223 USA

503.639.8098 800.477.7411

Fax 503.639.7619

May 23, 2003  
Project B17-01G

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
Northwest Region Voluntary Cleanup Program  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201-4987

**Re: Revised RI Report Schedule  
Willbridge Terminals  
Portland, Oregon**

Dear Ms. Kiernan:

This letter is submitted on behalf of the Willbridge Terminals Group (WTG) and documents the agreed upon revised submittal date for the remedial investigation (RI) report for the above-referenced project. As discussed in our telephone conversation on May 16, 2003, the new submittal date for the RI report is July 18, 2003. In addition, we discussed the status of the Oregon Department of Environmental Quality's (DEQ's) review of the "Source Control Evaluation Report" dated April 23, 2003. You stated that DEQ will be finished with the review of this document by the end of May 2003.

The WTG appreciates your assistance with this project and looks forward to the completion of the upland RI. If you have any questions, please contact Kelly Kline or Scott Miller at Delta Environmental Consultants, Inc. at 503/639-8098.

Sincerely,

**KHM is integrating its business with Delta Environmental Consultants, Inc. (Delta) to enhance our client service.**

A handwritten signature in black ink, appearing to read "Kelly Kline". The signature is fluid and cursive, with the first and last names clearly legible.

Kelly Kline, R.G.  
Senior Geologist

A handwritten signature in black ink, appearing to read "R. Scott Miller". The signature is more formal and blocky than the one above, with the first and last names clearly legible.

R. Scott Miller, P.E.  
Principal Engineer

A member of:  
The logo for Inogen Environmental Alliance features a stylized four-pointed star or cross shape. To the right of the star, the word "Inogen" is written in a bold, sans-serif font. Below "Inogen", the words "Environmental Alliance" are written in a smaller, sans-serif font.

COPPOR00012615

Ms. Jill Kiernan  
May 23, 2003  
Page 2

cc: Mr. Eric Conard, Kinder Morgan Energy Partners, Orange, California  
Mr. Steve Osborn, Kinder Morgan Energy Partners, Rocklin, California  
Mr. Marty Cramer, ConocoPhillips Company, Portland, Oregon  
Mr. Gerald O'Regan, ChevronTexaco Company, San Ramon, California  
Mr. Frank Fossati, Shell Oil Products US, Lake Forest, California  
Dr. Taku Fuji, Hart Crowser, Portland, Oregon



**FILE COPY**

## **MEMORANDUM**

**DATE:** November 14, 2002

**TO:** Taku Fuji, Ph.D.

**FROM:** Neil Morton

**RE:** Willbridge Terminal Data Review  
15302

**CC:** Kelly Kline, KHM

---

In addition to the comments provided below, I have a general question regarding the soil samples results, which are divided into three groups: vadose zone, capillary fringe, and saturated zone. My question is whether these samples actually fall into these three depth profiles, or if KHM simply put the shallow samples in the vadose zone, the middle depth samples in the capillary fringe zone, and the deepest samples in the saturated zone. For example, samples G-RF-3(9) [at a depth of 9-feet] and G-RF-2(3.5) [at a depth of 3.5 feet] were both collected adjacent to the Willamette River and are both shown on the capillary fringe figure (Figure 32). Also, sample G-HS-2(4) is identifies as a capillary fringe sample even though it was collected about 800-feet farther away from the river than G-RF-3(9). These samples were collected for the Kinder Morgan Property, but the concern is also relevant for the other sites and for Hot Spot samples. The main concern for our risk assessment is which samples were collected above and below the groundwater table.

Kinder Morgan Property, TOSCO Property, Chevron Asphalt (groundwater only), and Utility Boring (Subsurface Soil only) data have been reviewed. There was no figure containing the Utility Boring results, so the review was based only on the data tables. The hydropunch water, sediment, surface water, seep soil, and seep water samples were not reviewed.

### **KINDER MORGAN PROPERTY**

#### ***Groundwater***

- BTEX and VOCs: Monitoring Well 1 (MW-1) not on Figure 9;

- BTEX: MW-33 and MW-33-D have sample dates of 11/4/97 and 10/31/98, respectively, in Table 7.
- VOCs:
  - MW-13: Table 9 has a sample date of 12/9/98, while Figure 9 has a sample date of 10/27/98;
  - MW-30: Table 9 has a sample date of 12/8/98, while Figure 9 has a sample date of 10/29/97.
- PAHs:
  - MW-32: Figure 12 has a sample result of ND for PAHs, while Table 6 has no PAH results for this well;
  - MW-33: Table 6 has a sample date of 10/31/97, while Figure 12 has a sample date of 12/11/98.
- Pesticides: MW-13/MW-13D and MW-33/MW-33D, original and duplicate sample dates are from different years in Table 10.

### **Surface Soil**

- Pesticides: 17 pesticides are detected at a concentration of 313 g/kg in Table 32A. These concentrations are not bolded and do not appear on Figure 26.

### **Subsurface Soil**

- SVOCs: Table 29b identifies C-RF-1(16) and C-RF-3(12) as Kinder Morgan Property samples. Hart Crowser assumed that these were Chevron Property samples.
- VOCs: Figure 35 shows G-HP-13(18) as NA, but Table 30b has all NDs for this sample.
- BTEX, PAHs, and Aviation Gas: 2- and 2.5-foot hot spot samples not on Figure 29.
- Pesticides: Table 32b presents pesticide results for 12 samples; however, Figures 32 and 35 present results for 13 samples. G-RF-3(14) is listed as ND on Figure 35, but is not included in Table 32b.

## **TOSCO PROPERTY**

### **Groundwater**

- VOCs: B-6 and B-6(RR) were both sampled on 11/18/98 and are included in Table 9. Should both results be included in the risk assessment? If not, which result should be excluded? Both sets of results are included on Figure 10.

- PAHs: Sample B-37 is listed as ND for PAHs on Figure 13; however, Table 6 shows a phenanthrene detection of 0.112 µg/L.

### ***Surface Soil***

- PAHs: T-SS-14 and T-SS-14(RR) were both sampled on 11/6/98 and are included in Table 28a. Should both results be included in the risk assessment? If not, which result should be excluded? Only one set of results are included on Figure 10 (specific sample number not identified).

### ***Subsurface Soil***

- General: Sample T-RF-2(8) results on Figures 30 and 33. One set of results should be deleted.
- BTEX: Samples T-HS-4(12) and T-HS-4(17) listed in Tables 27b (Subsurface Soil) and 27c (Hot Spot Soil). One set of results should be deleted.

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Originator: <u>R. Scott Miller</u>	PM:
Job No.: <u>B17-01G</u>	Time Allotted to Complete:

Client Name: <u>Willbridge Terminals Group (WTG)</u>
Sac Name: <u>Willbridge</u>
Site Location: <u>Portland, OR</u>
Document Title: <u>Schedule for Final RI Report and Source Control/Evaluation Work Plan</u>
Document Type: <input checked="" type="checkbox"/> Letter <input type="checkbox"/> Report <input type="checkbox"/> Memo <input type="checkbox"/> Proposal <input type="checkbox"/> Table
<input type="checkbox"/> Form <input type="checkbox"/> Contract <input type="checkbox"/> Transmittal <input type="checkbox"/> GWM Report <input type="checkbox"/> Other
File Name and Network Subdirectory Containing Your Files: <u>G:\Willbridge\B17-01G 2002 RI Rewrite\</u>
Additional Instructions: <u>WTG Lett to DEQ - RI schedule</u>

Chain of Review:		
PM/Reviewer:	Initials	Date:
Project Manager: <u>Kelly Kline</u>	<u>KK</u>	<u>2/21/03</u>
Principal: <u>R. Scott Miller</u>	<u>RSM</u>	<u>02/21/2003</u>
Professional Stamp:		

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<u>Martin KRAMER - Conoco Phillips</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Gerald O'Regan - Chevron Texaco</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Steve Osborn - Kinder Morgan</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Eric Conant - Kinder Morgan</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Frank Fossick - Shell</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Taku Fuji - H&amp;M Casco</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
<u>Gerry Koschul - PNW</u>	<u>1</u>			<u>X</u>	<u>X</u>	<u>✓</u>				
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										Closed Out:



ENVIRONMENTAL MANAGEMENT, INC.

**FILE**

February 25, 2003

Ms. Jill Kiernan, P.E.  
Oregon Department of Environment Quality  
2020 SW Fourth Avenue, Suite 400  
Portland, OR 97201-4987

**Re: Schedule for Final RI Report and  
Source Control Evaluation Work Plan  
Willbridge Terminals Group  
Portland, Oregon**

Dear Ms. Kiernan:

KHM Environmental Management, Inc (KHM) on behalf of the Willbridge Terminals Group (WTG) has prepared this letter to provide you with the schedule for the final remedial investigation (RI) report and source control evaluation work plan. This letter also presents the approach to addressing the Oregon Department of Environmental Quality's (DEQ's) comment/clarifications presented in your letter dated December 19, 2002. WTG has started preparation of the final (revised) RI report, taking into account the following documents:

- DEQ's March 8, 2002 letter *DEQ Comments on the Draft Remedial Investigation Report*;
- WTG's August 15, 2002 *Comment Response Document* prepared by KHM;
- WTG's October 2, 2002 letter, prepared by KHM, regarding the understanding for the meeting held on September 17, 2002;
- DEQ's December 19, 2002 letter regarding the major issues and the management approach for the upland remedial investigation and source control evaluation; and
- This letter, specifically the clarifications to the comment responses.

The WTG appreciates the opportunity to complete the RI. This will allow efforts to be focused on the source control measures and addressing the potential upland risk under the Feasibility Study (FS) framework. Below are the response clarifications and the proposed schedule for the final RI report and the source control evaluation work plan. For clarity,

February 25, 2003

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the labeling/numbering scheme used in DEQ's December 19, 2002 letter has been adopted.

### **Management Approach for Uplands Remedial Investigation and Source Control Evaluation**

As stated in your December 19, 2002 letter, in-water investigations, risk-assessments, and remediation for Willamette River surface water and sediments at the Willbridge facilities will be performed under the Portland Harbor CERCLA process with the Environmental Protection Agency (EPA) as the lead oversight agency. The upland RI/FS, together with a source control evaluation and the CERCLA process for in-water work, will provide an effective management structure for the various aspects of environmental work at the Willbridge facilities. Evaluation of potential risk to upland human and ecological receptors from exposure to contaminants in soil, groundwater, upland surface water, air, and seeps will be completed under the upland RI and source control measures evaluation.

The WTG agrees with DEQ's request to complete a source control evaluation, separate from the upland RI, which will assess potential impacts from upland contamination to in-water receptors for the purposes of evaluating, designing and implementing source control measures. This source control evaluation will focus on groundwater discharges, separate-phase hydrocarbon (SPH) seeps, and overland transport such as stormwater discharges or bank erosion.

### **Comment Response Letter**

For response numbers 3, 11, 14, 69, 102, 126, 127, 128, 129, 130, and 134, it appears that the DEQ and WTG are in agreement. The final RI report will be prepared taking into account the above listed documents.

For response numbers 30, 94, 103, and 105, and the revised Conceptual Site Model (CSM); the risk assessment will qualitatively evaluate potential risks to on-site workers and landscape workers from the seeps that are above the mean high water mark. Other potential risks associated with seeps that are below the mean high water mark will be assessed under the source control evaluation.

CSM (Attachments A&B): The CSM currently identifies the inhalation of volatiles from groundwater as a potentially complete exposure pathway to be quantitated in the Human Health Risk Assessment. The dermal contact exposure pathway will be added to the CSMs as an exposure pathway to be quantitated. However, the incidental ingestion of groundwater by utility workers will remain identified as an incomplete/insignificant exposure pathway at this site. This is consistent with DEQ's Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites Guidance Document (Section B.3.3.5; DEQ, 1999), which does not require that this exposure pathway be evaluated, as it is likely to be limited when compared to the inhalation and dermal contact

exposure pathways. Additionally, any utility work that would be conducted would be completed in a trench that has been dewatered, as is generally required under OR-OSHA. This would significantly reduce that opportunity for incidental ingestion of groundwater by the utility workers.

For response numbers 31, 123, 126, 127, 128 and the revised CSM: The CSM identifies that the ingestion of surface soils by terrestrial ecological receptors will be evaluated in the ecological risk assessment. In addition, ingestion of subsurface soils will be added for appropriate terrestrial receptors (e.g., burrowing small mammals). The dermal contact pathway for terrestrial receptors has been identified as an insignificant exposure pathway as the dermal contact rates are very uncertain for ecological receptors, birds and mammals have much less open skin surface exposed than humans, and this pathway is very limited when compared to the soil ingestion pathway, which will be evaluated.

The evaluation of terrestrial ecological receptor exposure to SPH seeps will only be conducted for those seeps that are present above the mean high water mark. As discussed for the soil exposure pathways, the only exposure pathway that will be evaluated will be the incidental ingestion. Dermal contact with seeps will not be evaluated.

Response number 40: The source control evaluation framework is the appropriate place to discuss potential migration and discharge of groundwater to the Willamette River. As presented above, the source control evaluation will focus on groundwater discharges, separate-phase hydrocarbon (SPH) seeps, and overland transport such as stormwater discharges or bank erosion. The source control evaluation will also discuss the established interim remedial action measures (IRAM) at the 60-inch storm sewer outfall and the proposed IRAM measures at the location of the former 27-inch storm sewer outfall. As requested, discussion on the performance of the IRAM will continue to be provided as part of the semi-annual groundwater monitoring reports.

Response numbers 71 and 72: The WTG agrees with DEQ's statement that the consequences for separating upland and in-water work means that the hot spot evaluation will only be partially completed since it will only consider upland exposure scenarios.

Response numbers 82 and 84: The Exposure Point Concentrations (EPCs) will be calculated based on the 90<sup>th</sup> percentile upper confidence limit on the mean over each exposure unit.

Response number 107: EPCs for appropriate receptors will only be calculated for SPH seeps that are present above the mean high water mark.

Response number 126: Exposure of appropriate terrestrial ecological receptors (e.g., burrowing small mammals) will be evaluated for subsurface soils to a depth of one meter.

February 25, 2003

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Response number 135: Upland compounds of interest with the potential to bio-accumulate will be evaluated only if there are complete exposure pathways to appropriate ecological receptors.

#### **Schedule for Submittal of the Final RI Report**

WTG has started preparation of the final RI report taking into account the documents listed above. The schedule milestones for submittal of the Revised RI report are as follows:

<b>Action</b>	<b>Date</b>
Revise risk assessment (RA), tables, and figures	April 25, 2003
Revise text	May 9, 2003
Submittal for internal review by WTG	May 16, 2003
Comment period for the WTG	May 30, 2003
Finalize the Revised RI report	June 6, 2003
Submittal of the Revised RI report to the DEQ	June 13, 2003

#### **Schedule for Outline Submittal for the Source Control Evaluation Work Plan**

It is anticipated that recent and historical groundwater monitoring and sampling results from the monitoring wells near the Willamette River will be reviewed and that this information along results from seep sampling and IRAM will be presented in a draft source control evaluation work plan. The draft work plan will discuss the evaluation of information, potential data gaps, existing and proposed IRAM, and the potential scope of assessment activities to address the identified data gaps. The schedule milestones for submittal of the Source Control Evaluation Work Plan are as follows:

<b>Action</b>	<b>Date</b>
Review of existing information and IRAM summary	March 21, 2003
Submittal for internal review by WTG	March 28, 2003
Comment period for the WTG	April 11, 2003
Finalize the Draft Work Plan	April 18, 2003
Submittal of the Draft Work Plan to the DEQ	April 25, 2003



February 25, 2003

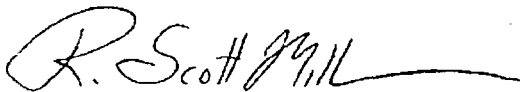
Page 5

WTG has started preparation of the final RI report and the source control evaluation work plan under the scheduled milestones listed above. Should you have any questions regarding the clarifications listed, or comments to the proposed schedules, please contact the undersigned at (503) 639-8098.

Respectfully yours,  
**KHM Environmental Management, Inc.**



Kelly Kline, R.G.  
Senior Geologist



R. Scott Miller, P.E.  
Principal Engineer

cc: Mr. Gerald O'Regan – ChevronTexaco Company  
Mr. Martin Cramer – ConocoPhillips Company  
Mr. Steve Osborn – Kinder-Morgan Energy Partners  
Mr. Eric Conard - Kinder-Morgan Energy Partners  
Mr. Frank Fossati – Shell Oil Company  
Mr. Taku Fuji – Hart Crowser  
Mr. Gerry Koschal, PNG Environmental



ENVIRONMENTAL MANAGEMENT, INC.

July 18, 2002  
Project B17-01G

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
2020 SW Fourth Ave, Suite 400  
Portland, Oregon 97201

**RE: Revised Schedule for changes to the Remedial  
Investigation Report  
Willbridge Terminals Group  
Portland, Oregon  
DEQ File No. WMCSR-NWR-94-06**

Dear Ms. Kiernan:

On behalf of the Willbridge Terminals Principal Responsible Parties Group (RP Group), KHM Environmental Management, Inc. (KHM) has prepared this revised schedule for the Remedial Investigation (RI) report. This revised schedule reflects the Oregon Department of Environmental Quality's (DEQ) comments to the proposed schedule for revising the RI report as provided in your June 5, 2002 letter.

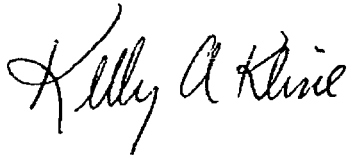
The attached Gantt chart presents the revised timeline for this project. Incorporating the review of the endangerment assessment prior to the submittal of written comments to the DEQ has extended the timeline for the submittal of the written comments; now scheduled for August 23, 2003. Please propose a few convenient dates for a project meeting within the approximate time period outlined in Line 10 of the attached Gantt chart, (around the week starting September 9, 2002).

July 18, 2002  
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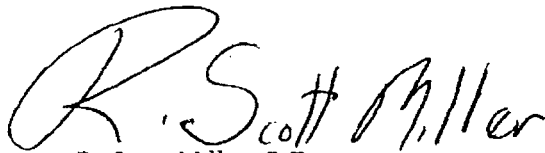
In accordance with the attached revised schedule, changes to the RI report are underway. KHM looks forward to working with you in finalizing this RI report. If you need further information or have any questions, please call the undersigned at (503) 639-8098.

Sincerely,

**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



R. Scott Miller, P.E.  
Principal Engineer

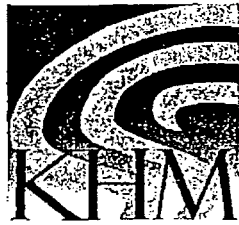
Cc: Mr. Martin Cramer, Phillips Petroleum Company  
Mr. Eric Conard, Kinder Morgan Energy Partners  
Mr. John Foxwell, c/o Kinder Morgan Energy Partners  
Mr. Gerald O'Regan, Chevron Products Company  
Mr. Frank Fossati, Shell Oil Company  
Mr. Gerry Koschal, PNG Environmental, Inc.  
Mr. Taku Fuji, Hart Crowser, Inc.



### Revised Schedule for Willbridge R'

ID	Task Name	Start	Finish	May 2002	Jun 2002	Jul 2002	Aug
				5/2 5/8 5/9 5/16	5/23 5/30 5/31	6/7 6/14 6/21	6/28 7/5 7/12
1	Receive Work Authorization from all Three Parties.	5/31/2002	5/31/2002				
2	Initial Comment Response Review	5/31/2002	6/17/2002				
3	Meeting Between Hart Crowser and KHM	7/9/2002	7/9/2002				
4	Internal Comment Response Document Preparation	5/31/2002	7/23/2002				
5	Submit Internal Response Document to PRP Group	7/25/2002	7/25/2002				
6	Comment Period for PRP Group	7/25/2002	8/8/2002				
7	Receive PRP Group Comments	8/8/2002	8/8/2002				
8	Incorporate PRP Comments	8/8/2002	8/16/2002				
9	Comments to DEQ	8/23/2002	8/23/2002				
10	Meeting With DEQ	8/8/2002	8/8/2002				
11	QA/QC Data Tables and Figures	5/31/2002	7/12/2002				
12	Submit Data to Hart Crowser	7/15/2002	7/15/2002				
13	Generate New Figures	6/10/2002	7/12/2002				
14	Review Endangerment Assessment	7/19/2002	7/23/2002				
15	Perform Endangerment Assessment	8/23/2002	10/30/2002				
16	Revise Non-Endangerment Assessment Related Text	8/23/2002	10/30/2002				
17	Receive Completed Endangerment Assessment from Hart Crowser	10/31/2002	10/31/2002				
18	Revise Endangerment Assessment Related Text	10/31/2002	11/21/2002				
19	Internal Draft to PRP Group	11/22/2002	11/22/2002				
20	Comment Period for PRP Group	11/25/2002	12/11/2002				
21	Receive Comments from PRP Group	12/12/2002	12/12/2002				
22	Meeting with DEQ	12/19/2002	12/19/2002				
23	Finalize Draft RI Report	12/20/2002	1/3/2003				
24	Submit Draft RI to DEQ	1/6/2003	1/6/2003				





ENVIRONMENTAL MANAGEMENT, INC.

FILE COPY

May 20, 2002  
Project No. B17-01G

Ms. Jill Kiernan  
Department of Environmental Quality – Northwest Region  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201

**Re: Proposed Schedule for Revising the Remedial  
Investigation Report  
Willbridge Terminals Group  
Portland, Oregon**

Dear Ms. Kiernan:

On behalf of the Willbridge Terminals Responsible Parties Group (RP Group), KHM Environmental Management, Inc. (KHM) has prepared this letter to propose a schedule for revising the Remedial Investigation (RI) report for the Willbridge Terminals. The report will be revised to address the Department of Environmental Quality's comments presented in a letter dated April 8, 2002.

KHM will continue to serve as the lead RI consultant. The RP group has selected Hart Crowser to revise the human health and ecological risk assessments.

The attached Gantt Chart presents the proposed timeline for the project. Please review the proposed schedule and provide us with either a written approval of the schedule or your comments. Additionally, please propose a few convenient dates for a project meeting within the approximate time period outlined in Line 9 (week of 7/25/02) of the attached Gantt Chart.

KHM looks forward to working with you in finalizing this Remedial Investigation report. If you need further information or have any questions, please call the undersigned at (503) 639-8098.

May 20, 2002  
Page 2

Sincerely,  
**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Scott Miller, P.E.  
Principal Engineer

Cc Mr. Martin Cramer, Phillips Petroleum Company  
Mr. Eric Conard, Kinder Morgan Energy Partners  
Mr. John Foxwell, c/o Kinder Morgan Energy Partners  
Mr. Frank Fossati, Shell Oil Company  
Mr. Gerald O'Regan, Chevron Products Company  
Mr. Gerry Koschal, PNG  
Environmental, Inc.  
Dr. Taku Fuji, Hart Crowser, Inc.

ID	Task Name	Start	Finish	May 2002				Jun 2002				Jul 2002				Aug 2002				Sep 2002			
				5/12	5/19	5/26	6/2	6/9	6/16	6/23	6/30	7/7	7/14	7/21	7/28	8/4	8/11	8/18	8/25	9/1	9/8	9/15	9/22
1	Receive Work Authorization from all Three Parties	5/31/2002	5/31/2002																				
2	Initial Comment Response	5/31/2002	6/17/2002																				
3	Meeting Between Hart Crowser and KHM	6/18/2002	6/18/2002																				
4	Internal Comment Response Document Preparation	5/31/2002	7/2/2002																				
5	Submit Internal Response Document to PRP Group	7/3/2002	7/3/2002																				
6	Comment Period for PRP Group	7/3/2002	7/18/2002																				
7	Receive PRP Group Comments	7/19/2002	7/19/2002																				
8	Incorporate PRP Comments	7/19/2002	7/24/2002																				
9	DEQ Meeting / Communications	7/25/2002	7/31/2002																				
10	QA/QC Data Tables and Figures	5/31/2002	6/10/2002																				
11	Submit Data to Hart Crowser	6/11/2002	6/11/2002																				
12	Generate New Figures	6/10/2002	6/17/2002																				
13	Perform Endangerment Assessment	6/25/2002	7/31/2002																				
14	Revise Non-Endangerment Assessment Related Text	6/10/2002	6/24/2002																				
15	Receive Completed Endangerment Assessment from Hart Crowser	8/1/2002	8/1/2002																				
16	Revise Endangerment Assessment Related Text	8/1/2002	8/22/2002																				
17	Internal Draft to PRP Group	8/23/2002	8/23/2002																				
18	Comment Period for PRP Group	8/23/2002	9/10/2002																				
19	Receive Comments from PRP Group	9/11/2002	9/11/2002																				
20	Meeting with DEQ	9/16/2002	9/16/2002																				
21	Finalize Draft RI Report	9/17/2002	9/26/2002																				
22	Submit Draft RI to DEQ	9/27/2002	9/27/2002																				



ENVIRONMENTAL MANAGEMENT, INC.

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October 2, 2002

Project B17-01G

Ms. Jill Kiernan

Oregon Department of Environmental Quality  
Northwest Region Voluntary Cleanup Program  
2020 SW Fourth Avenue, Suite 400  
Portland, Oregon 97201-4987

Dear Ms. Kiernan:

This letter is submitted on behalf of the Willbridge Terminals Group (WTG) and presents our understanding of the items discussed during our meeting on September 17, 2002 regarding the Draft Remedial Investigation Report (RI) for the Willbridge Terminals Group Site ("the site"). The WTG appreciates the time the Oregon Department of Environmental Quality (DEQ) project team spent meeting with us regarding the ongoing upland RI for the site. As we discussed in our meeting, the WTG has assigned a high priority to finalizing the upland RI.

The WTG provided a letter to the DEQ dated August 15, 2002 describing the manner in which each of the comments raised by the DEQ in their March 8, 2002 comment letter would be addressed. During our meeting, DEQ discussed several of the comment responses; however, the WTG has not received written approval from the DEQ regarding the comment responses. The WTG would like a written response/approval from the DEQ regarding our comment responses prior to initiating the revisions to the upland RI and the supporting risk assessment.

At this time, the WTG would like to summarize and document the major issues discussed during our meeting:

- 1) The DEQ is requesting a Source Control Evaluation to identify possible upland/surface water interactions and to identify possible receptors.
- 2) The WTG request DEQ's acknowledgement that the upland and in-water (sediment) issues will be managed separately. This is consistent with the manner in which other Remedial Investigation in the Portland Harbor Initial Study Area (ISA) are currently being conducted.



October 2, 2002

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We believe that the future CERCLA cleanup activities, together with a source control evaluation, will provide an effective management structure for in-water issues. As indicated verbally in our meeting, the WTG is willing to develop a proposal for a source control evaluation. However, we must emphasize again our desire to complete the upland RI independently of the source control evaluation. Also, it is important to note that the need for source control has already been identified at two separate locations at the site, and mitigating actions are underway at both locations.

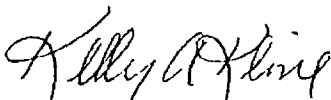
In order to begin making progress towards completing the upland RI, we propose/request the following items of the DEQ:

- 1) The WTG will prepare a source control evaluation proposal and submit it to the DEQ by December 1, 2002. As discussed during our September 17, 2002 meeting, many of the comments to the draft RI report, including Comment No. 3, may be more appropriately addressed in the framework of a source control evaluation.
- 2) DEQ to provide the WTG written acknowledgement that the upland and in-water (sediment) issues will be managed separately. The upland issues will be addressed under the existing consent order, with in-water issues being addressed under CERCLA process together with the source control evaluation.
- 3) The DEQ to provide written approval, with comment as applicable, to our comment responses letter dated August 15, 2002. Upon receiving approval from the DEQ, the WTG will move forward to finalize the upland RI and will provide a revised schedule to the DEQ for all project activities.

The WTG appreciates your assistance with this project and looks forward to the completion of the upland RI. The WTG also looks forward to receiving your responses to this letter. If you have any questions, please contact Kelly Kline or Scott Miller at KHM at 503/639-8098.

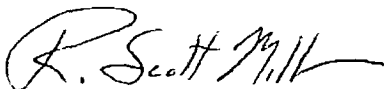
Sincerely,

**KHM Environmental Management, Inc.**



Kelly Kline, R.G.

Senior Geologist



R. Scott Miller, P.E.

Principal Engineer

October 2, 2002

Page 3

cc: Mr. Eric Blischke, DEQ, Portland, Oregon  
Mr. Eric Conard, Kinder Morgan Energy Partners, Orange, California  
Mr. Steve Osborn, Kinder Morgan Energy Partners, Fairfield, California  
Mr. Marty Cramer, Phillips Petroleum Company, Portland, Oregon  
Mr. Gerald O'Regan, Chevron Oil Company, San Ramon, California  
Mr. Frank Fossati, Shell Oil Products US, Lake Forest, California  
Dr. Taku Fuji, Hart Crowser, Portland, Oregon  
Mr. Gerry Koschal, PNG Environmental, Tigard, Oregon

## MEMORANDUM

**CH2M HILL**

**TO:** Ross Rieke/PDX  
**COPIES:** File  
**FROM:** Scott McKinley/CVO  
**DATE:** July 25, 1994  
**SUBJECT:** Monitoring Well Inventory of Willbridge Site  
**PROJECT:** OPE39281.IA.DR

This memorandum presents information obtained from a field survey performed at the Willbridge Oil Terminal on July 7, 1994. The purpose for conducting the survey was to field verify the location and identification of wells shown on a CH2M HILL drawing prepared from autocad files supplied by the field consultants. The location and identification markups shown on the attached drawing may be used to correct our current version. At some point, we should consider surveying the wells for horizontal location (coordinates) for use in modeling and remediation design if necessary. We should also confirm that the same vertical datum is being used by all three field consultants.

During the survey, I also performed a visual inspection of each well to judge the physical condition of the surface casing and seal for use in assessing the wells suitability for future RI/FS groundwater monitoring. Many of the wells at the Unocal and Chevron sites were constructed prior to comprehensive Water Resources (OWRD) and Department of Environmental Quality's regulations governing monitoring well construction. While I don't expect DEQ to ask that these wells be abandoned and replaced, some form of well integrity assessment may be requested prior to using them for RI/FS sampling. Data obtained from this field survey combined with well construction information to be supplied by the field consultants (Table 1) will assist in the completion of the well integrity assessment. Electronic versions (Microsoft Excel ver. 4.0) of Table 1 are provided on the attached disks. Please forward these tables with the sample cover letter (attached) to the field consultants.

If the Willbridge site is to be considered a single unit, then we need to request that the field consultants perform the next round of water level measurements and water quality sampling on the same date and time.

### Field Verification Survey

#### *Chevron*

Most of the wells are properly located. I adjusted the locations of several in the light products tank farm area to show what I believe to be their correct location. I was unable

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## MEMORANDUM

Page 2

July 25, 1994

to confirm the following:

1. Three well locations which are shown on our map along the shore of the Chevron dock, north of wells B-9, B-20 and B-7. These locations are not labeled, nor are they shown on any of the maps contained in the Preliminary Assessment report. I suspect these are "stray" symbols.
2. Identification of well located west of truck maintenance shop in dock area. The symbol shown on our drawing looks like B-28, however, there is already a B-28 on the south side of Front Street. The well casing cap did not have a legible identification label.
3. Location of well CR-11 which is supposed to be located on the north side of the lube oil tank farm. There is some ongoing construction work in this area and the well may be temporarily covered. Tim commented on this well during our site visit.

### *Shell*

Most of the wells are properly located. I made some adjustments in the dock area by judging the wells location relative to existing tanks. The Shell representative who was with me at the time assisted in these adjustments. I was unable to confirm the location of well MW-36 which is supposed to be situated on the north side of the Olympic Gas Pipeline enclosed area. I did find a "weathered" eight inch diameter mild steel casing at the purported location, however, its appearance did not match that of the other Shell monitoring wells. The interior of the casing was blocked with debris several feet below ground surface, so I was unable to determine if the casing penetrated the water table.

Two of the wells appear to be identified as No. 5. The first one, located near the load out rack, is identified in the field as # 5 and labeled as #35 on our drawing. The second well, located at the northeast corner of the South tank farm is labeled #5 on our drawing and is not labeled on the protective casing as the other wells are. Wells MW-8, MW-9, MW-6 and MW-22 were also not labeled on the protective casing, therefore, the labels shown on our map are assumed to be correct.

### *Unocal*

The majority of the Unocal wells are located in a cluster within the dock area and the locations shown are reasonably accurate. I did make some minor adjustments which would prove useful if a smaller symbol size were used on the drawing.

# MEMORANDUM

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July 25, 1994

I was unable to confirm the following:

1. The location of well B-23 which is supposed to be at the northwest corner of the tank farm. The well may be covered with loose soil which predominates in the area. The well just east of here, well B-27 is situated on the south edge of the sidewalk.
2. The location of U-1, between the brick building and containment wall west of Tank 2915.

## Monitoring Well Integrity Assessment - Surface Casing and Seal

My notes on the surface casing and seal inspection are provided in Attachment 1. General observations for each of the facilities are summarized in the following subsections.

### *Chevron*

At the Chevron site, there are 23 two-inch and 4 four-inch diameter monitoring wells (SCH 40 PVC casing) set inside flush-mounted protective casings. The protective casings are generally labeled with a "CO" (cleanout), "water", or "monument". Many of the protective casings have partially filled with fine-grained sand transported via wind and rain from unpaved portions of the site. Several wells within paved areas which were also partially filled with this sand exhibited evidence of oil and grease contamination inside the surface casing. The potential for oil and grease to enter down the well may exist if surface water entry and leaky well caps are permitted.

The Chevron monitoring network appears to be in marginal condition and may require some maintenance to bring it up to RI/FS standards. It is unlikely that all of the existing Chevron wells will be used for RI water quality evaluations. For the wells which are selected, I recommend that the surface casings be cleaned to remove sand accumulations and visible oil and grease, if present. The majority of the wells are concentrated in the dock area and I would expect that new well installations inside the tank farm area will be required for RI/FS work.

### *Shell*

At the Shell site, there are 37 two-inch diameter wells (SCH 40 PVC) set inside above ground protective casings (26) or flush mounted protective casings (11). The Shell wells are of recent construction (Law Crandall, 1991) and are easily identifiable in the field. I did not open the locked casing and assume the well casing inside the protective casing is ok. Overall, the Shell monitoring network appears satisfactory, and the wells placed to

wbwellin.mem

# MEMORANDUM

Page 4

July 25, 1994

provide uniform site coverage.

## *Unocal*

There are 27 wells at the Unocal facility, even though I did not locate two of them. 21 of the wells are clustered in the dock area with many of these placed around two extraction wells (one total fluids extraction well was running at 10 gpm). The Unocal wells are also two-inch diameter (SCH40 PVC) wells placed inside flush mounted protective casings. Many of the protective casings were partially filled with a fine-grained sand present in unpaved areas of the site. Some visible oil and grease contamination of the sand inside the protective casing was noted.

As with the Chevron wells, those selected for RI water quality monitoring should be cleaned to remove visible evidence of oil and grease.

**Attachment 1**  
**Willbridge Monitoring Well**  
**Field Location Verification Notes**  
**July 1994**

SUBJECT Willbridge Well InventoryBY S. McKinley DATE 7/6/94SHEET 1 OF       PROJECT NO. OPE 39231, IA, DR

Chevron

<u>Time</u>	<u>Well ID</u>	<u>Location</u>	<u>Surface Description</u>
1155	CR-10	Approx 20' south of west side TK 129 or south side of access road	4" PVC Subgrade completion. TOC is 0.6' bgs
1205	CR-8	At foot of access ramp at NE corner of Lab Bldg	4" PVC Subgrade completion. TOC is 0.7' bgs
1215	CR-7	20' east of Terminal Office	4" PVC Subgrade completion. TOC is 0.5' bgs
1220	CR-6	30' east of Bldg #2	4" PVC Subgrade completion. TOC is 0.4' bgs. Oil and grease inside protective casing. Not labeled.
1227	B-24	As shown on drawing just south of asphalt patch for new lig. pipeline running beneath Downe Ave	2" PVC subgrade completion. TOC is 0.2' bgs. Probable oil and grease contamination inside protective casing. Surface casing says "water".
1236	B-28	As shown on drawing at south edge of sidewalk outside containment wall north of tank pointed in chevron logo	2" dia PVC Subgrade completion. TOC is 0.3' bgs. dirty inside protective casing
1254	B-29	As shown on drawing at south edge of sidewalk 10' east of hydrant. Outside containment wall north of TK 52	2" dia PVC subgrade completion. TOC is 0.2' bgs. Surface casing is filled with sediment. Surface casing has "CO" on lid.
1247	B-30	As shown on drawing at south edge of sidewalk outside containment wall north of TK 1 and 20' east of hydrant	2" dia PVC Subgrade completion. Top of casing is 0.5' bgs. Filled with sediment unlabeled. Surface casing lid has "CO" on it.
1304	CR-3	As shown on drawing on west side of 8' x 10 concrete catchment pad near SW cor. of north tank form. Just outside containment wall	4" dia PVC Subgrade completion. TOC is 0.3' bgs. Clean inside.
1311	B-11	As shown on drawing just west of ground shack	Unable to open. Suspect 2" PVC subgrade completion. Surface casing has "CO" on top.
1318	B-14	8' south of door to 5124 bldg	2" PVC subgrade completion. TOC is 0.1' bgs. Oil/grease contaminated sediment inside surface casing

Subgrade Completions = 16" dia. steel vault with locking J-Plugs  
CR wells are newer

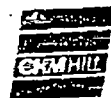




SUBJECT \_\_\_\_\_ BY \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET 2 OF \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_

Chevron (cont)

Time	Well Id	Location	Surface Data
1323	B-13	As shown on drawing. Approx 6' north of fence and 15' west of gate	2" PVC Subgrade completion TOC 0.4' bgs. Surface casing filled with sediment "CO"
1328	B-12	As shown on drawing. Approx 6' north of fence just east of yellow protective post array	2" PVC Subgrade completion TOC 0.2' bgs. Surface casing filled with sediment Casing lid has no marks on it
1335	B-A	As shown on drawing Approx 10' east of Firehose box or west side of Fire lane area	2" PVC Subgrade completion TOC is 0.2' bgs. Oil and grease contamination inside Surface Casing and well casing "Water"
1340	B-10	As shown on drawing Underneath spill equipment trailer just north of walkway over pipe rack. Unpaved	2" PVC Subgrade completion TOC 0.3' bgs. "Monument" on casing lid
1345	B-15	As shown on drawing 20' north of Truck Maintenance Bldg. Paved area	2" PVC Subgrade completion TOC is 0.5' bgs Has standing water and heavy iron staining not used recently "CO"
1350	B-21	As shown on drawing 9' west of enclosed area. In paved area	2" PVC Subgrade completion TOC is 0.1' bgs has standing water "Water" on Surface casing lid
1355	B-32	30' north of B-21 and 20' west of fence in paved area	2" PVC Subgrade completion TOC is 0.5' bgs. relatively clean inside "Monument" on casing lid
1406	B-8	20' NNE of B-32 and 15' west of fence	2" PVC Subgrade completion TOC is 0.2' bgs Oil & grease sediment contamination inside
1404	B-7	35' North of B-8 inside fence at NE corner of paved area	2" PVC Subgrade completion TOC 0.2' bgs 0.6 sediment inside "CO" on lid
1410	B-9	25' east of fence line and 12' South of NW corner of Paved area	2" PVC Subgrade completion TOC 0.2' bgs "CO" on casing
1414	B-20	20' South of fence line between midway between B-7 and B-9	2" PVC Subgrade. Standing water "Water" on cover
1418	B-19	22' east of Sewer MH in West center of paved parking area	2" PVC Subgrade. Standing water Minor sediment "CO" on cover
1422	B-33	40' South of B-9	2" PVC Subgrade TOC is 0.1' bgs visible Oil and grease inside within sediment "Monument"
1432	CR-4	25' South of Tank 3 on South side underneath pipetrack	4" PVC Subgrade TOC is 0.3' bgs
1445	CR-9	30' SSE of entrance to TBA Warehouse. or entrance SE corner of facility	4" PVC Subgrade TOC is 0.7' bgs Casing has reses on it
1630	CR11	Did not locate. May be underneath construction materials	



SUBJECT \_\_\_\_\_

BY \_\_\_\_\_

DATE \_\_\_\_\_

SHEET 3 OF \_\_\_\_\_

PROJECT NO. \_\_\_\_\_

## Shell

Time	Well ID	Location Desc	Surface Desc
1505	MW34	Located North of TK GS	Aboveground Composite Marked. Outside. Located
1510	MW33	Located north of TK66	GS above
1515	MW37	South of Shell Pier just north of east-west fence	Surface completion
* 1530	MW36	Location shown on Hard Crowder Map corresponds with 8" dia mild steel casing with open top Unable to locate	
1545	MW5	SW corner of load on rack 3	Surface completion. Label outside
1548	MW14	As shown on drawing	Yellow above ground comp. Located
1549	MW13	As shown on drawing	Yellow, age, labeled
1552	MW16	As shown on drawing	Y, age, labeled
1554	MW2	As shown on drawing	Y, age, labeled
1556	MW12	As shown	Y, age, labeled
1558	MW11	As shown	Y, age, labeled
1600	MW9	As shown	Y, age, labeled
1603	MW10	Located slightly further north than shown	Y, age, labeled
1605	MW4	As shown	Y, age, labeled
1607	MW7	As shown	Surface completion. Label
1610	MW8	As shown, 35' SSE of guard shack	Surface completion. Not casing says "manhole"
* 1614	MW5	As shown 8' east of containment wall	Surface completion, not casing says "manhole"
1616	MW3	As shown	Y, age, labeled
1617	MW6	As shown	Surface completion, n. labeled, lid says "manhole"
* 1620	MW5	on east side of Solomon Creek Flume	Surface completion to GS No 5
1622	MW1	As shown	
1624	MW17	As shown inside fenced area	Y, age, labeled
1626	MW21	As shown just south of paved parking area in fence	Surface completion in
1635	MW23	As shown	Y, age, labeled
* 1640	MW32	As shown. New smaller tanks have been installed in this area	Y, age, labeled
1645	MW22	As shown @ SE corner of drum lubricant storage area	Surface completion not labeled

Shell (cont)

Time	Well Id	Location Desc	Surface Desc
1650	MW31	As shown	Y, AGC, labeled
1651	MW30	As shown	Y, AGC, labeled
1653	MW29	As shown	Y, AGC, labeled
1654	MW28	As shown	Surface Completion
1657	MW26	As shown	Y, AGC, labeled
1659	MW25	As shown, Tank 65 has been removed	Y, AGC labeled
1701	MW27	As shown, Tank 53 has been removed	Y, AGC, labeled
1703	MW24	As shown	Y, AGC, labeled
1705	MW20	As shown	Y, AGC, labeled 1.5' surface casing sticking in concrete pad
1708	MW19	Located slightly further south than shown	Surface Completion, labeled
37 wells 1715	MW18	As shown on west side of Track #2 approx 25' west of SW Cor Containment Wall	Surface Completion, labeled found (18" dia) post

7-7-94 Unocal

1422	B-5	As shown on drawing 10' North of fence line in unpaved area	2" PVC Subgrade Completion. TOC is 0.7' bgs minor sediment in surface casing labeled "Monument" on casing lid
1426	B-6	As shown on drawing 15' east of SW corner fence Unocal property	2" PVC surface completion TOC is 0.5' bgs. Minor sediment inside "Monument" on lid
1429	B-4	As shown on drawing 10' south of gate in paved area to Unocal dock	2" PVC surface completion TOC is 0.2' bgs. sediment inside casing "Monument" on lid surface
1433	B-17	As shown on drawing In east center portion of unpaved area Unocal dock area	2" PVC surface completion TOC is 0.15' bgs minor surface water inside surface casing "Monument" on lid
1437	B-16	As shown on drawing 25' east of Chevron Unocal fence in unpaved area	2" PVC surface completion TOC is 0.3' bgs, minor surface water inside surface casing. Lid has "CO" on it
1440	B-2	As shown on drawing in NW corner of Unocal dock area	2" PVC surface completion 0.3' above ground casing full of surface water

shell surface completion = 2'x2' concrete pad

↓ AGC = painted yellow casing, 24-36" high with 2'x2' concrete  
flush part

Unocal/ Chevron = Surface completion is 8" dia steel moni set in  
concrete



SUBJECT \_\_\_\_\_ BY \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET 5 OF \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_

### Unocal (cont.)

Time	Well ID	Location Desc	Surface Desc
1448	B-3	As shown on drawing, 20' north of telephone booth in dock area	2" PVC Surface completion in unpaved/gravel area. TOC is 0.5' bgs. Surface casing filled to top of PVC rim with sediment
1452	B-36	As shown on drawing At base of concrete retaining wall in dock area	2" PVC Surface completion in unpaved sandy area. TOC is 1.0' bgs casing is full (over top of well casing) with surface water
1458	B-1	As shown on drawing, 15' south of fence line in north part of dock area	2" PVC Surface completion in gravel area. Minor sediment in surface casing. TOC is 0.3' bgs
1500	N-1	As shown on drawing 10' north of B-1 on north side extraction well	2" PVC Surface completion in gravel area. TOC is 1.0' bgs oily sediment inside
1503	EW	As shown on drawing, situated between B-1 and N-1. 5' south to B-1 and 5' north to N-1	12" dia mild steel casing above ground. Three electrical wires running inside casing. Suggest pump/ still in place.
1515	B-39	Located 40' east of Whse in Unocal dock area	2" PVC Surface completion in dirt area. TOC is below water inside surface casing. TOC 0.7' bgs
1517	B-40	As shown on drawing 35' north of B-39	2" PVC Surface completion in dirt area. TOC is 0.8' bgs. Med sediment inside surface casing.
1520	B-22	As shown on drawing 30' south of B-39	2" PVC Surface completion in dirt area. TOC is 0.4' bgs oily sediment inside surface casing
1522	EW	As shown on drawing 12' south of B-22	12" mild steel casing extraction well. Equipped with centrifugal pump (75)
1527	B-41	As shown on drawing 10' south of EW	2" PVC Surface completion in dirt area. TOC 0.05' bgs Surface casing filled with sediment
1530	B-18	As shown on drawing 15' north of fence line and 8' east of sewer manhole	2" PVC Surface completion in dirt area. Casing is 0.2' above ground. Well casing filled with ground surface. Surface casing filled with sediment
1534	EW	As shown on drawing	8" mild steel extraction well pump 10 gpm. Total fluids pump compressed air available



SUBJECT \_\_\_\_\_ BY \_\_\_\_\_ DATE \_\_\_\_\_  
SHEET 6 OF \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_

Time	Well ID	Location Desc.	Surface Desc.
1540 <del>8-3</del>	B-38	As shown on drawing 15' NW of EW	2" PVC Surface completion Surface casing extends 0.3' ags Well casing 1.0' bgs minor sediment inside
1545	B-37	As shown on drawing 20' ENE of EW	2" PVC Surface completion in dirt area. TOC is 1.0' bgs unlocked, oily sediment inside
1545	B-25	As shown. Appears to be McCall Oil property, (on other side of fence)	Did not field verify
1556	EW-3	As shown	Inactive at present. 12" mild steel total fluids recover. well
1558	U-4	As shown. 10' north of EW-3	4" PVC Surface completion in dirt area. TOC is 0.4' bgs
1602	B-27	Located on South edge of sidewalk along south side of Front St North of Unocal TK 3407	in dirt area 2" PVC Surface completion TOC is 0.4' bgs. Oily sediment inside surface casing. Casing says "Test Station" on it
1615	B-23	Not located	
1618	U-3	20' north of TK 4259	4" PVC Surface completion in gravel area. Surface casing lead says "Water" on it 2' x 2' concrete pad
1625	U-2	As shown	End similar Surface casing as U-3 but unable to open
1645	U-1	Not located	

27 wells



ENVIRONMENTAL MANAGEMENT, INC.

March 2, 2001  
Project B17-01D

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
2020 SW Fourth Ave, Suite 400  
Portland, Oregon 97201

**RE: Proposed Schedule for Completion of the RI/FS  
Willbridge Terminals Site  
Portland, Oregon  
DEQ File No. WMCSR-NWR-94-06**

Dear Ms Kiernan:

Per our telephone conversation on February 6, 2001, KHM Environmental Management, Inc. (KHM) has prepared this letter to present a proposed schedule for completion of the remedial investigation/ feasibility study (RI/FS). We have prepared this proposed schedule on behalf of the Willbridge Terminals Responsible Parties (RP) Group (Table 1).

The proposed schedule is based upon a set number of days following Department of Environmental Quality (DEQ) milestones. The first of these milestones is the completion of the review of the Draft RI Report by DEQ. Once KHM has received the comments from the DEQ, we will review the comments and prepare a response letter to the DEQ explaining how each of the comments will be addressed. This response letter will be prepared within 10 working days of receipt of the DEQ comments. The Final RI Report will be submitted to DEQ 15 working days after all outstanding comments and issues have been resolved to DEQ's satisfaction.

The Draft FS Work Plan will be submitted to DEQ on April 16, 2001. As with the RI Report, a response letter will be prepared within 10 working days of receipt of DEQ comments on the Draft FS Work Plan. The response letter will explain how each of the comments will be addressed. The FS Work Plan will be finalized 10 working days after KHM has received notice that all outstanding comments and issues have been resolved to DEQ's satisfaction or after the finalization of the RI Report, whichever occurs later.

The Draft FS Report will be submitted to DEQ 90 days after finalization of the FS Work Plan. As with the previous referenced documents, a response letter will be generated

REDMOND, WASHINGTON  
PORTLAND, OREGON  
SAN JOSE, CALIFORNIA  
CROCKET, CALIFORNIA

• 18350 REDMOND WAY • 98052  
• 123 NE 3RD STREET, SUITE 300 • 97232  
• 6284 SAN IGNACIO AVENUE, SUITE E • 95119  
• 565 CLARK STREET • 94525

• PHONE: (425) 558-0134 • FAX: (425) 869-7494  
• PHONE: (503) 233-4068 • FAX: (503) 233-4917  
• PHONE: (408) 224-4724 • FAX: (408) 224-4518  
• PHONE: (510) 787-6756 • FAX: (510) 787-6756

March 2, 2001

Page 2

within 10 working days of receiving DEQ comments on the Draft FS Report. The response letter will explain how each of the comments will be addressed. The Final FS Report will be submitted to DEQ 20 working days after receiving and resolving the final comments from DEQ on the Draft FS Report.

The RP Group believes that this proposed schedule will allow for optimum use of time and resources both by DEQ and the RP Group. Furthermore, it will reduce the iterations of review for related documents that are dependent on draft documents previously submitted, but not approved and finalized. If DEQ is amenable to this proposed schedule, please provide written agreement.

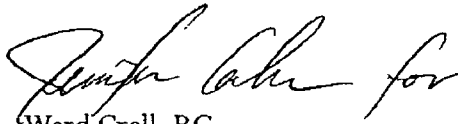
If you need further information or have any questions, please call (503) 233-4068.

Sincerely,

**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Ward Crell, RG  
Principal Geologist

Attachment: Table 1 – Proposed Schedule of Deliverables

Cc: Martin Cramer, Tosco Refining Company  
Eric Conard, GATX Terminals Corporation  
Gerald O'Regan, Chevron Products Company  
Frank Fossati, Shell Oil Company

B17-01D

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**TABLE 1**  
**PROPOSED SCHEDULE OF DELIVERABLES**

TASK	SCHEDULE
RI Report Response Letter	10 working days after receipt of DEQ comments on Draft RI Report
Final RI Report	15 working days after resolution of all outstanding comments and issues
Draft FS Work Plan	April 16, 2001
Final FS Work Plan	10 working days after resolution of all outstanding DEQ comments and issues or after finalization of RI Report, whichever is later
Draft FS	90 days after finalization of FS Work Plan
Final FS	15 working days after resolution of all outstanding DEQ comments and issues



File Copy



ENVIRONMENTAL MANAGEMENT, INC.

September 15, 2000  
Project B17-01D

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
2020 SW Fourth Ave, Suite 400  
Portland, Oregon 97201

**RE: Status of Remedial Investigation  
Willbridge Terminals Site  
Portland, Oregon  
DEQ File No. WMCSR-NWR-94-06**

Dear Ms Kiernan:

On behalf of the Willbridge Terminals Principal Responsible Parties Group (RP Group), KHM Environmental Management, Inc. (KHM) has prepared this letter to notify you of a project change and to present an update on the status of the Remedial Investigation (RI) Report. As of August 2000, the RP Group has contracted with KHM to finish the RI report and to conduct monthly product recovery and quarterly groundwater monitoring and sampling. KHM personnel (Kelly Kline and Nate Hemphill) conducted the majority of the field activities for the RI while employed by the IT Corporation.

Currently, we are compiling the data necessary to finish the RI report and are obtaining files needed from IT Corporation for this project. KHM anticipates submitting the draft RI report to the Oregon Department of Environmental Quality (DEQ) during December 2000. KHM will be submitting the third quarterly report for the year 2000 in October 2000.

KHM's Portland office has recently changed locations. Our new address and telephone numbers are as follows:

KHM Environmental Management, Inc.  
123 NE 3<sup>rd</sup> Street, Suite 300  
Portland, Oregon 97232  
Telephone: (503) 233-4068  
Fax: (503) 233-4917

16771 NE 80<sup>th</sup> STREET - SUITE 203  
REDMOND, WASHINGTON - 98052  
PHONE: (425) 558-0134  
FAX: (425) 869-7494

7150 SW HAMPTON STREET - SUITE 240  
TIGARD, OREGON - 97223  
PHONE: (503) 639-2721  
FAX: (503) 639-7932

CROCKFORD, CALIFORNIA  
PHONE: (510) 787-6756  
FAX: (510) 787-2371

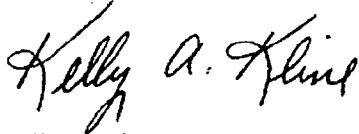
September 15, 2000

Page 2

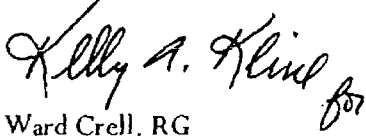
KHM looks forward to working with you to move this project through the RI phase.  
If you need further information or have any questions, please call (503) 233-4068.

Sincerely,

**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Ward Crell, RG  
Principal Geologist

Cc: Martin Cramer, Tosco Refining Company  
Eric Conard, GATX Terminals Corporation  
Gerald O'Regan, Chevron Products Company  
Frank Fossati, Shell Oil Company



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region Portland Office

2020 SW 4<sup>th</sup> Avenue, Suite 400

Portland, OR 97201-4987

(503) 229-5263

FAX (503) 229-6945

TTY (503) 229-5471

October 16, 2000

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Martin Cramer  
Tosco Refining Company  
P.O. Box 76  
Portland, OR 97207

Ron Schwab  
Unocal Corporation  
Diversified Businesses  
376 S. Valencia Avenue  
Brea, CA 92823

Frank Fossati  
Shell Oil Products Company  
P.O. Box 219  
Lake Forest, CA 92630-0219

Eric Conard  
GATX  
1363 North Gaffey Street  
San Pedro, CA 90731

**RE: Extension of Due Date for Remedial Investigation Report**  
Willbridge Bulk Fuels Facilities

Gentlemen:

In response to DEQ's Notice of Noncompliance NWR-ECD #00-066, for failure to submit documents required under the Consent Order, Mr. Frank Fossati, on behalf of the Willbridge Respondents, requested that DEQ extend the due date for submittal of the Draft Remedial Investigation (RI) Report to December 15, 2000. The reason for the extension would be to allow for modifications to correct deficiencies of an existing draft RI document prior to submittal by DEQ. DEQ agrees to this extension of the due date for submittal of the Draft RI Report in the interest of receiving a quality report. However, please be advised that if a Draft RI Report is not submitted to DEQ by the close of business on December 15, 2000, DEQ will issue stipulated or civil penalties per section 7.L. of the Order on Consent or Oregon Administrative Rules 340-12-073, calculated from the original due date of September 19, 2000, for the Draft RI Report submittal as established in the DEQ-approved Remedial Investigation Work Plan.

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According to the RI/FS Project Schedule, as approved in RI Work Plan, the Final RI Report is to be submitted to DEQ within 56 working days from submittal of the Draft RI Report to DEQ. Due to the delay in submitting the Draft RI Report, the Final RI Report will now be due March 9, 2001. However, as the preparation of the Feasibility Study (FS) Work Plan is not dependent on DEQ approval of the Final RI Report, the due dates for the submittal of the Draft and Final FS Work Plans to DEQ will not change. The Draft FS Work Plan is due March 1, 2001, and the Final FS Work Plan is due April 27, 2001. In addition, DEQ does not believe that it is necessary to delay the preparation of the Feasibility Study Report. As such, in accordance with the schedule, the Draft FS Report will be due to DEQ on June 25, 2001, and the Final FS Report due on September 20, 2001.

Again, be advised that these dates are enforceable under the terms of the Consent Order. Failure to submit the deliverables by these dates will be regarded by DEQ as violations subject to stipulated or civil penalties.

If you have any questions concerning this matter you may contact me at 503-229-6900 or Dave St. Louis at 503-229-5532.

Sincerely,



Jill Kieman, P.E. *JK*  
DEQ Project Engineer

cc: Neil Mullane, DEQ NWR Administrator  
Dave St. Louis, DEQ NWR Site Response Mgr  
Les Carlough, DEQ NWR Enforcement Mgr  
Charlie Landman, DEQ WPM  
Kurt Burkholder, DOJ  
Mike Rosen, DEQ NWR Voluntary Cleanup/Portland Harbor Mgr  
Kelly Kline, KHM





# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
Suite 400

Portland, OR 97201-4987  
(503) 229-5263 Voice  
TTY (503) 229-5471

May 16, 2000

Richard Reis, P.E.  
IT Corporation  
555 South Renton Village Place, Suite 700  
Renton, WA 98055-3295

RE: Willbridge Bulk Fuel Facilities  
DEQ Comments on April 21, 2000 Revised Remedial Investigation Work Plan

Dear Rich:

Enclosed are DEQ's comments on the revised *Remedial Investigation Work Plan, Willbridge Facility, Portland, Oregon*, prepared by Pacific Environmental Group/IT Corporation and dated April 21, 2000. Please incorporate the appropriate changes and submit revised pages of the work plan to me by June 15, 2000.

If you should have any questions regarding these comments, please feel free to call me at 503-229-6900.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

Attachment

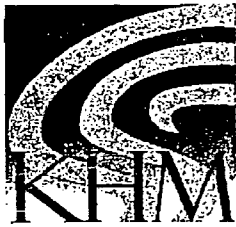
cc w/attachment: Gerald O'Regan/Chevron USA Products Co.  
Martin Cramer/TOSCO Corp.  
Eric Conard/GATX Tank Storage Terminals Corp.  
Frank Fossati/Shell Oil Products Co.

**DEQ COMMENTS ON APRIL 21, 2000  
REVISE REMEDIAL INVESTIGATION WORK PLAN**

**WILLBRIDGE FACILITY**

1. Figure 2-3. Please verify the location of the 19,000 gallon ethanol spill at the Chevron facility near Tank 58 (Spill #19 on Figure 2-3). Previous information submitted by Chevron to DEQ regarding this spill showed Tank 58 at a location approximately 400 feet to the southwest of the location of Spill #19 shown on Figure 2-3.
2. Figure 3-3. The legend should include the facility names of the properties #15, 16, 17, and 18, which are shown on the figure.
3. Section 6.5.1. The proposed contaminant screening process for addressing cumulative effects from multiple contaminants is acceptable provided there are less than 10 contaminants in each carcinogenic and noncarcinogenic group. A different screening method to address cumulative effects, such as that proposed in DEQ's *Guidance for Conduct of Deterministic Human Health Risk Assessment*, should be used if there are more than 10 contaminants in each of the carcinogenic and noncarcinogenic groups.
4. Tables 6-3 and 6-7. The PEF values listed should be  $1.32 \times 10^9 \text{ m}^3/\text{kg}$ , and not  $1.32 \times 10^9 \text{ m}^3/\text{kg}$ . ✓  
The E.F.E. did use the right factor.
5. Table 6-5. The EF value listed should be 9 days/year. An E,F value should be defined in the table which, based on DEQ guidance, is 2 events/day.
6. Table 6-6. The  $DA_{\text{event}}$  for inorganics appears to be incorrectly defined (see DEQ guidance).
7. Table 6-8. Please define and provide a value for the "K" factor listed in the equation.
8. Section 6.6.1.3. DEQ requests that dermal exposures to soil and groundwater be evaluated quantitatively in the HHRA using extrapolated absorbed doses. DEQ recognizes the limitations of these extrapolation methods, however, since dermal exposures can contribute significantly to overall risk, an attempt should be made to quantify this exposure route. The limitations of the extrapolation methods can be presented and discussed qualitatively in the uncertainty section of the Remedial Investigation/Baseline Risk Assessment Report.
9. Section 8.1. Please revise the names of the company representatives and consultant managers as appropriate.

10. Section 8.2. Please update the schedule as appropriate. Clarify if a Baseline Risk Assessment Report will be part of the Remedial Investigation (RI) Report. If the RI Report includes the results of the Baseline Risk Assessment, please allow 45 days for DEQ review of this Report. If not, then add separate line items for the submittal and review of this report and allow for a DEQ review period of 30 days each for the draft RI Report and Baseline Risk Assessment Report. Also, please allow 30 days for DEQ review of the Feasibility Study (FS) Work Plan and the FS Report.



ENVIRONMENTAL MANAGEMENT, INC.

**FILE COPY**

March 15, 2001  
Project B17-01D

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
2020 SW Fourth Ave, Suite 400  
Portland, Oregon 97201

**RE: Schedule for Completion of the RI/FS  
Willbridge Terminals Site  
Portland, Oregon  
DEQ File No. WMCSR-NWR-94-06**

Dear Ms Kiernan:

Per our telephone conversation on March 14, 2001, KHM Environmental Management, Inc. (KHM) has prepared this letter to present a schedule for completion of the remedial investigation/ feasibility study (RI/FS). We have prepared this schedule on behalf of the Willbridge Terminals Responsible Parties (RP) Group (Table 1).

The schedule is based upon a set number of days following Department of Environmental Quality (DEQ) milestones. The first of these milestones is the completion of the review of the Draft RI Report by DEQ. Once KHM has received the comments from the DEQ, we will review the comments and prepare a response letter to the DEQ explaining how each of the comments will be addressed. This response letter will be prepared within 10 working days of receipt of the DEQ comments. The Final RI Report will be submitted to DEQ 15 working days after all outstanding comments and issues have been resolved to DEQ's satisfaction.

The Draft FS Work Plan will be submitted to DEQ on April 16, 2001. As with the RI Report, a response letter will be prepared within 10 working days of receipt of DEQ comments on the Draft FS Work Plan. The response letter will explain how each of the comments will be addressed. The FS Work Plan will be finalized 10 working days after KHM has received notice that all outstanding comments and issues have been resolved to DEQ's satisfaction or after the finalization of the RI Report, whichever occurs later.

The Draft FS Report will be submitted to DEQ 90 calendar days after finalization of the FS Work Plan. As with the previous referenced documents, a response letter will be generated

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REDMOND, WASHINGTON	• 18350 REDMOND WAY • 98052	• PHONE: (425) 558-0134 • FAX: (425) 869-7494
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SAN JOSE, CALIFORNIA	• 6284 SAN IGNACIO AVENUE, SUITE E • 95119	• PHONE: (408) 224-4724 • FAX: (408) 224-4518
CROCKET CALIFORNIA	• 565 CLARK STREET • 94525	• PHONE: (510) 787-6756 • FAX: (510) 787-6756

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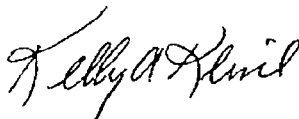


within 10 working days of receiving DEQ comments on the Draft FS Report. The response letter will explain how each of the comments will be addressed. The Final FS Report will be submitted to DEQ 20 working days after receiving and resolving the final comments from DEQ on the Draft FS Report.

The RP Group believes that this schedule will allow for optimum use of time and resources both by DEQ and the RP Group. Furthermore, it will reduce the iterations of review for related documents that are dependent on draft documents previously submitted, but not approved and finalized. If DEQ is amenable to this schedule, please provide written agreement.

If you need further information or have any questions, please call (503) 233-4068.

Sincerely,  
**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Ward Crell, RG  
Principal Geologist

Attachment: Table 1 – Schedule of Deliverables

Cc: Martin Cramer, Tosco Refining Company  
Eric Conard, GATX Terminals Corporation  
Gerald O'Regan, Chevron Products Company  
Frank Fossati, Shell Oil Company

**TABLE 1**  
**SCHEDULE OF DELIVERABLES**

TASK	SCHEDULE
RI Report Response Letter	10 working days after receipt of DEQ comments on Draft RI Report
Final RI Report	15 working days after resolution of all outstanding comments and issues
Draft FS Work Plan	April 16, 2001
FS Work Plan Response Letter	10 working days after receipt of DEQ comments on Draft FS Work Plan
Final FS Work Plan	10 working days after resolution of all outstanding DEQ comments and issues or after finalization of RI Report, whichever is later
Draft FS Report	90 calendar days after finalization of FS Work Plan
FS Report Response Letter	10 working days after receipt of DEQ comments on Draft FS Report
Final FS	20 working days after resolution of all outstanding DEQ comments and issues



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
Suite 400  
Portland, OR 97201-4987  
(503) 229-5263 Voice  
TTY (503) 229-5471

July 19, 1999

Gerald O'Regan  
Chevron USA Products Company  
6001 Bollinger Canyon Road  
P.O. Box 5004  
San Ramon, CA 94583-0804

Frank Fossati  
Shell Oil Products Company  
P.O. Box 219  
Lake Forest, CA 92630-0219

Martin Cramer  
TOSCO Corporation  
5528 Northwest Doane Avenue  
Portland, OR 97210

Kelly Kline  
16115 SW Westminster Drive  
Tigard, Oregon 97224

Eric Conard  
GATX Tank Storage Terminals Corporation  
P.O. Box 9007  
Long Beach, CA 90810-0007

RE: Willbridge Bulk Fuel Facilities  
DEQ Comments on 4/19/99 Revised Remedial Investigation Work Plan

Gentlemen:

Enclosed are DEQ's comments on the revised *Remedial Investigation Work Plan, Willbridge Facility, Portland, Oregon*, prepared by Pacific Environmental Group and dated April 19, 1999.

If you should have any questions regarding these comments, please feel free to call me at 503-229-6900.

Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

Attachment

cc w/attachment: Mavis Kent, DEQ/NWR  
Bruce Hope, DEQ/WMC



DEQ-1

COPPOR00012659

**DEQ COMMENTS ON 4/19/99 REVISED  
REMEDIAL INVESTIGATION WORK PLAN**

**WILLBRIDGE FACILITY**

1. Section 2.3.1.3. Update the text discussion, as well as, Table 2-2 and Figure 2-3 to include the two most recent Chevron spills (12,031 gallons of lube oil on 6/9/98 and the 19,000 gallon of ethanol near Tank 58 on 3/20/99).
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11. Section 4.3, page 29. The data gaps should include insufficient groundwater data with respect to the northwest portion of the GATX facility along Front Avenue. Two additional data gaps should also be added: inadequate assessment of potential impacts to terrestrial organisms, and insufficient detailed ecological information regarding the terrestrial and aquatic components on the site and adjacent river. (see DEQ 2/16/98, Comment #38)
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15. Section 6. Tables 6-1 through 6-8 need to be appropriately revised to address DEQ's previous comments. (see DEQ 2/16/98, Comments #71, 72, 73, 74, 75, 76, and 77).
16. Section 6. Table 6-5. This table should be revised to be consistent with the text described in Section 6.5.5. The method shown for estimating dermal contact with soil should be consistent with DEQ's risk assessment guidance.
17. Section 6.5.1. This section should also address how the screening process will address cumulative (additive) effects. (see DEQ 11/10/98, Comment #1)
18. Section 6.5.5, page 43 and Tables 6-1, 6-3, 6-4, 6-7, and 6-8. With respect to use of the FI factor, it is not apparent that DEQ's previous comment has been addressed. (see DEQ 2/4/99, Response #4).
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20. Section 7.3.3(D), page 53. For the selection of COPCs for sediments, DEQ currently prefers the use of the Dredged Material Evaluation Framework Screening Values (ACOE, 1998). The text should be appropriately revised.
21. Section 8.2. DEQ requests that a detailed schedule with timelines and dates be provided to include the following items:
  - submittal of the Remedial Investigation/Risk Assessment Report (RI work completed to date),
  - submittal of Phase 2 Remedial Investigation Work Plan (if additional RI work is required based on results of initial phase of RI work)
  - performance of Phase 2 Remedial Investigation work (if necessary),
  - submittal of Phase 2 Remedial Investigation Report (if Phase 2 work conducted),
  - submittal of Feasibility Study Work Plan,
  - conductance of a Feasibility Study, and
  - submittal of a Feasibility Study Report.
22. Appendix A, Section A.3.3.2. The sediment sampling depth interval should be consistent with that provided in Section 5.4.2.
23. Appendix A, Section A.5. The SOPs for subsections A.5.3, A.5.4, and A.5.5 are missing from the report. An SOP for the push probe sampling should also be provided if not included as part of A.5.3.
24. Appendix A, Section A.5.8.4. The sediment sampling depth interval as specified in step #3 should be consistent with that provided in Section 5.4.2.
25. Appendix B, Section 1.4. Delete the first sentence of this section and reference to the consent order in the second sentence. The DEQ Consent Order does not specifically identify contaminants of concern at the site, rather it requires the identification of all hazardous substances at the site that may have been released into the environment. Halogenated volatile organics should also be listed as potential contaminants of concern. (see DEQ 2/16/98, Comments #95 & 96).

## REFERENCES

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*DEQ 2/4/99: DEQ Letter to Lance Geselbracht, Pacific Environmental Group dated February 4, 1999, regarding "Questions Concerning the Human Health Risk Assessment".*



ENVIRONMENTAL MANAGEMENT, INC.

June 9, 2000  
Project B17-001A

Mr. Gerald O'Regan  
Chevron Products Company  
6001 Bollinger Canyon Road, Building L  
San Ramon, California 94583-5004

Mr. Marty Cramer  
Tosco Distribution Company  
5528 NW Doane Avenue  
Portland, Oregon 97210

Mr. Eric Conard  
GATX Terminals Corporation  
1363 North Gaffey Street  
San Pedro, California 90731-1323

Mr Frank Fossati  
Shell Oil Company  
23591 El Torro Road  
Lake Forest, California 92630

**RE: Draft RI Report Evaluation**  
**Willbridge Terminals**  
**Portland, Oregon**

Dear Gentlemen:

Per your request, KHM Environmental Management, Inc. (KHM) has prepared an evaluation of the draft remedial investigation report prepared by IT Corporation (IT) for the facility referenced above. KHM is providing these services to Tosco and GATX on a direct contract basis and to Chevron as a Network Associate with Delta Environmental Consultants, Inc. (Delta).

## **PURPOSE OF WORK**

KHM reviewed the contents of the draft remedial investigation report (Report) to identify any for significant errors and/or sections where modifications could offer substantial benefits to the project. Our goal was to ensure that the arguments presented in the remedial investigation report are technically accurate and do not commit the project to an undesirable regulatory pathway.

## **RI REPORT EVALUATION**

The review of the RI Report was conducted by two members of the team assembled by KHM for the Willbridge project: Kelly Kline, R.G. from KHM and Brad Berggren, P.E. from RSV Engineering, Inc. (RSV). Several areas of concern were identified during the review. In general, the areas identified indicate items identified that the technical and

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FAX: (510) 787-6756

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regulatory arguments presented in the Report do not convey a clear depiction of the current environmental conditions or regulatory framework associated with the site. KHM believes that the Report warrants modification in order to present an accurate depiction of site conditions and guide the Willbridge Terminals toward the most cost-effective remedy. In addition, the Report's contents need to demonstrate to the Department of Environmental Quality (DEQ) that the tasks completed during the remedial investigation were conducted following the appropriate DEQ guidance document. This will provide the DEQ reviewer confidence that the investigation is on track which will benefit the project's future progress.

### **LOCALITY OF FACILITY**

The locality of the facility is defined by DEQ as "any point where a human or an ecological receptor contacts or is reasonably likely to come into contact with facility-related hazardous substances". Based on this definition, Section 2.1.2 of the Report titled "*Locality of the Facility*" is presented too early in the Report. The determination of the locality of the facility is based upon several factors presented later in the RI Report. In addition, the Report does not present a convincing argument for establishing the boundaries of the locality. There is no discussion of site conditions supporting an accurate conceptual site model that substantiates the determination of the locality boundaries. This section should be modified to better comply with the available DEQ guidance documents.

### **HOT SPOT IDENTIFICATION**

The DEQ defines hot spots in their regulations and the guidance document titled "*Guidance for Identification of Hot Spots*". As stated in this guidance "The definition of hot spots depends upon the medium that is contaminated. Generally, for water, a hot spot exists if contamination results in a significant adverse effect on the beneficial use of that resource and if restoration or protection of the beneficial use can occur within a reasonable amount of time. For media other than water, a hot spot exists if the site presents an unacceptable risk and if the contamination is highly concentrated, highly mobile or cannot be reliably contained". Based upon the definition of hot spots, such items as groundwater beneficial use, land use determination, and exposure pathways need to be discussed prior to the hot spot determination section. Therefore, the hot spot determination section is also presented too early in the Report. This section should follow the risk assessment discussion in the RI Report since results of the risk assessment are critical to establishing whether or not hot spots exist at a facility.

This section should also be modified to better comply with Oregon regulations and the guidance document for hot spots. The modification should be organized to follow the proposed work steps of the DEQ verbally approved RI work plan. The work plan called for first determining if the areas where the two most recent spills occurred would qualify as

areas containing hot spots under the Oregon Administrative Rules (OAR) using DEQ's guidance titled "*Guidance for Identification of Hot Spots*". This is not the approach presented in the Report for the hot spot evaluation. KHM also believes that the analytical results from all of the samples should be reviewed to see if higher concentrations were detected outside of these "surrogate hot spot areas". If higher concentrations exist outside of the "surrogate hot spot areas" and no discussion of this fact is presented in the Report, DEQ may interpret that the wrong areas were chosen for the surrogate hot spot analysis. This may result in DEQ requesting additional sampling to provide data for further hot spot evaluation.

The hot spot evaluation does not include a discussion of the liquid-phase hydrocarbons that are consistently observed in a few of the site's monitoring wells. Also, the Report does not discuss the current method for addressing/treating these liquid-phase hydrocarbon hot spot areas. The Report should identify the locations of liquid-phase hydrocarbon occurrence and designate these areas as hot spots. The Report should describe the current monthly program for liquid-phase hydrocarbon collection and discuss the effectiveness of this program. This program should be given credit as a component of the site remedy that is treating these hot spots.

In addition, the hot spot determination section does not include an analysis of whether or not the contamination adversely affects each of the identified likely beneficial uses for groundwater and surface water as consistent with Oregon rules and guidance.

#### **BENEFICIAL USES OF GROUNDWATER/SURFACE WATER**

This section of the Report is very important in determining the future direction of this project. Care needs to be taken while preparing this section to identify only the reasonably likely beneficial uses of water. For instance, we do not want to determine that the groundwater may be used for drinking water in the future unless we are very certain this will happen. A drinking water beneficial use would result in potentially identifying groundwater as a hot spot. As discussed in the previous section, if a potential hot spot is identified there may be a preference for treatment to restore the beneficial use. In this example, the potential hot spot would be evaluated in the feasibility study to determine whether or not the beneficial use can be restored in a reasonable time period. As demonstrated with this example, misidentifying a reasonably likely beneficial use could directly result in an increased cost for the selected remedy for the site. Moreover, if we eliminate a beneficial use, we want to make certain that we can defend this decision.

The "*Beneficial Use of Groundwater / Surface Water*" section of the Report is incomplete. Not all of the potential beneficial uses of groundwater and surface water identified in DEQ's guidance have been evaluated. To be consistent with DEQ's guidance an addition of a table showing the potential uses of groundwater and surface water would better depict beneficial

usage. This table would also present the reasons why the potential uses are either not reasonably likely or are reasonably likely for the conditions of this site.

## DISCUSSION OF LABORATORY DATA

The major issue in this section of the Report is that the analytical results are still compared to USEPA Region 9 generated preliminary remediation goals (PRGs). The PRGs may have been useful as a screening tool in the early phases of the project, but now that the hot spot identification, the groundwater and surface beneficial uses determination, and the site-specific endangerment assessments have been completed, the PRGs are not applicable. For example, the Report compares the groundwater analytical results to the PRG for tap water (drinking water). However, the Report indicates that drinking water was not a reasonably likely beneficial use for groundwater. Therefore, the PRG for tap water is not an appropriate remediation goal or comparison standard at this stage of the project. Similar arguments can be made for each of the comparisons of RI analytical results to PRGs.

Some minor reorganization of this section would also be appropriate. For example, the Report has a subsection for semivolatile organic compounds (SVOCs) and polynuclear aromatic hydrocarbons (PAHs). PAHs compounds are a subset of the SVOCs and should be discussed as such. The same situation occurs when the Report discusses volatile organic compounds (VOCs) and benzene, toluene, ethylbenzene, and xylenes (BTEX) separately.

## CONCLUSIONS

The conclusion section of the Report leaves the reader unsure of what was accomplished and what is the next step to regulatory closure for this project. The conclusion section should emphasize the findings of the investigation and discuss how these findings support the conceptual site model. The conclusion section is possibly the most critical section of the Report, since this is likely the last section (if not the only section) read and typically creates the final impression of the site. Concepts and conclusions clearly presented in this final section are typically what are remembered by the reader, including regulatory agencies. This is the section where the RP Group needs to clearly present what are and are not issues at the site and start setting the stage for where the project should be headed technically and regulatorily.

In summary, the conclusion section lays out what you want the reader to remember and understand about the site. The conclusion section of the draft RI Report does not adequately serve this critical function.

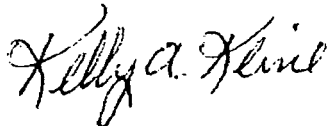
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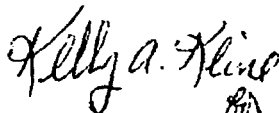
KHM's Willbridge Terminal team appreciates the opportunity to assist the RP Group with this remedial investigation report. Please call the undersigned if you have any questions regarding the contents of this evaluation.

Sincerely,

**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Ward Crell, R.G.  
Principal Geologist

G:\khn\RI Evaluation



# Oregon

John A. Kitzhaber, M.D., Governor

## Department of Environmental Quality

Northwest Region  
2020 SW Fourth Avenue  
Suite 400  
Portland, OR 97201-4987  
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July 19, 1999

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Sincerely,

Jill Kiernan, P.E.  
Senior Project Engineer

Attachment

cc w/attachment: Mavis Kent, DEQ/NWR  
Bruce Hope, DEQ/WMC



DEQ-1

COPPOR00012669

**DEQ COMMENTS ON 4/19/99 REVISED  
REMEDIAL INVESTIGATION WORK PLAN**

**WILLBRIDGE FACILITY**

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  - performance of Phase 2 Remedial Investigation work (if necessary),
  - submittal of Phase 2 Remedial Investigation Report (if Phase 2 work conducted),
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  - conductance of a Feasibility Study, and
  - submittal of a Feasibility Study Report.
22. Appendix A, Section A.3.3.2. The sediment sampling depth interval should be consistent with that provided in Section 5.4.2.
23. Appendix A, Section A.5. The SOPs for subsections A.5.3, A.5.4, and A.5.5 are missing from the report. An SOP for the push probe sampling should also be provided if not included as part of A.5.3.
24. Appendix A, Section A.5.8.4. The sediment sampling depth interval as specified in step #3 should be consistent with that provided in Section 5.4.2.
25. Appendix B, Section 1.4. Delete the first sentence of this section and reference to the consent order in the second sentence. The DEQ Consent Order does not specifically identify contaminants of concern at the site, rather it requires the identification of all hazardous substances at the site that may have been released into the environment. Halogenated volatile organics should also be listed as potential contaminants of concern. (see DEQ 2/16/98, Comments #95 & 96).



## REFERENCES

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ENVIRONMENTAL MANAGEMENT, INC.

February 2, 2000  
Project B17-01D

Ms. Jill Kiernan  
Oregon Department of Environmental Quality  
2020 SW Fourth Ave, Suite 400  
Portland, Oregon 97201

**RE: Status of Remedial Investigation Report Review**  
**Willbridge Terminals Site**  
**Portland, Oregon**  
**DEQ File No. WMCSR-NWR-94-06**

Dear Ms Kiernan:

On behalf of the Willbridge Terminals Principal Responsible Parties Group (RP Group), KHM Environmental Management, Inc. (KHM) has prepared this letter to inquire about the status of the Oregon Department of Environmental Quality's (DEQ) review of the draft Remedial Investigation (RI) Report submitted on December 15, 2000. We were hoping to receive comments by the end of January 2001 so we could adequately respond to the upcoming Final RI Report submittal deadline. The DEQ has had the Draft RI report now, for 45 days, and we have not yet received your comments, nor have we received communication as when we will receive your comments.

In your letter dated October 16, 2000, you state that per the approved RI Work Plan the Final RI Report will be due 56 days after submittal of the Draft RI Report and that date is March 9, 2001. This schedule allows for 45 days of review by the DEQ and 10 days for the RP Group to address each of the DEQ comments and respond with a Final RI Report. Without knowing the scope of the DEQ comments, this schedule seems unachievable unless the DEQ comments are minor and non-substantive in nature.

If you feel that DEQ is going to require the full 45 days to review the report and you believe that you have more than minor comments that will require an RP response, we hope that you will consider an extension of the March 9, 2001 submittal date. We propose that the new submittal date be based upon the receipt of DEQ comments and suggest that the RP Group have 30 days to finalize the RI after receipt of DEQ comments.

REDMOND, WASHINGTON  
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February 2, 2001

Page 2

The RP Group feels that the deadline for the Draft FS Work Plan is reasonable and does not need adjustment. However, more than 10 days will be required to finalize future draft documents after receipt of DEQ comments. To address this issue, we would like you to consider that future deadlines be based upon a set number of days following DEQ milestones. For example, the Draft FS would be due a set number of days after DEQ approval of the final FS Work Plan and the Final FS be due a given number of days after DEQ approval of the Draft FS.

The RP Group believes that this change would allow for optimum use of time and resources both by DEQ and the RP Group. Furthermore, it will reduce the iterations of review for related documents that are dependent on draft documents previously submitted, but not approved and finalized. If DEQ is amenable to this change, the RP Group will provide a proposed schedule amendment for your review.

If you need further information or have any questions, please call (503) 233-4068.

Sincerely,

**KHM Environmental Management, Inc.**



Kelly A. Kline, RG  
Senior Geologist



Ward Crell, RG  
Principal Geologist

Cc: Martin Cramer, Tosco Refining Company  
Eric Conard, GATX Terminals Corporation  
Gerald O'Regan, Chevron Products Company  
Frank Fossati, Shell Oil Company



ENVIRONMENTAL MANAGEMENT, INC.

very  
8/6

Date: August 6, 2001

Project: B17-01D

To: Ms. Jill Kiernan  
Oregon DEQ - Northwest Region  
2020 SW 4<sup>th</sup> Avenue, Suite 400  
Portland, Oregon

We have enclosed:

Copies	Description
<u>3</u>	<u>Revised Figure 37 for the Remedial Investigation at the Willbridge Facility</u>

For your:

<input type="checkbox"/>	Use
<input type="checkbox"/>	Approval
<input checked="" type="checkbox"/>	Review
<input type="checkbox"/>	Information

Comments: \_\_\_\_\_  
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Ward Crell

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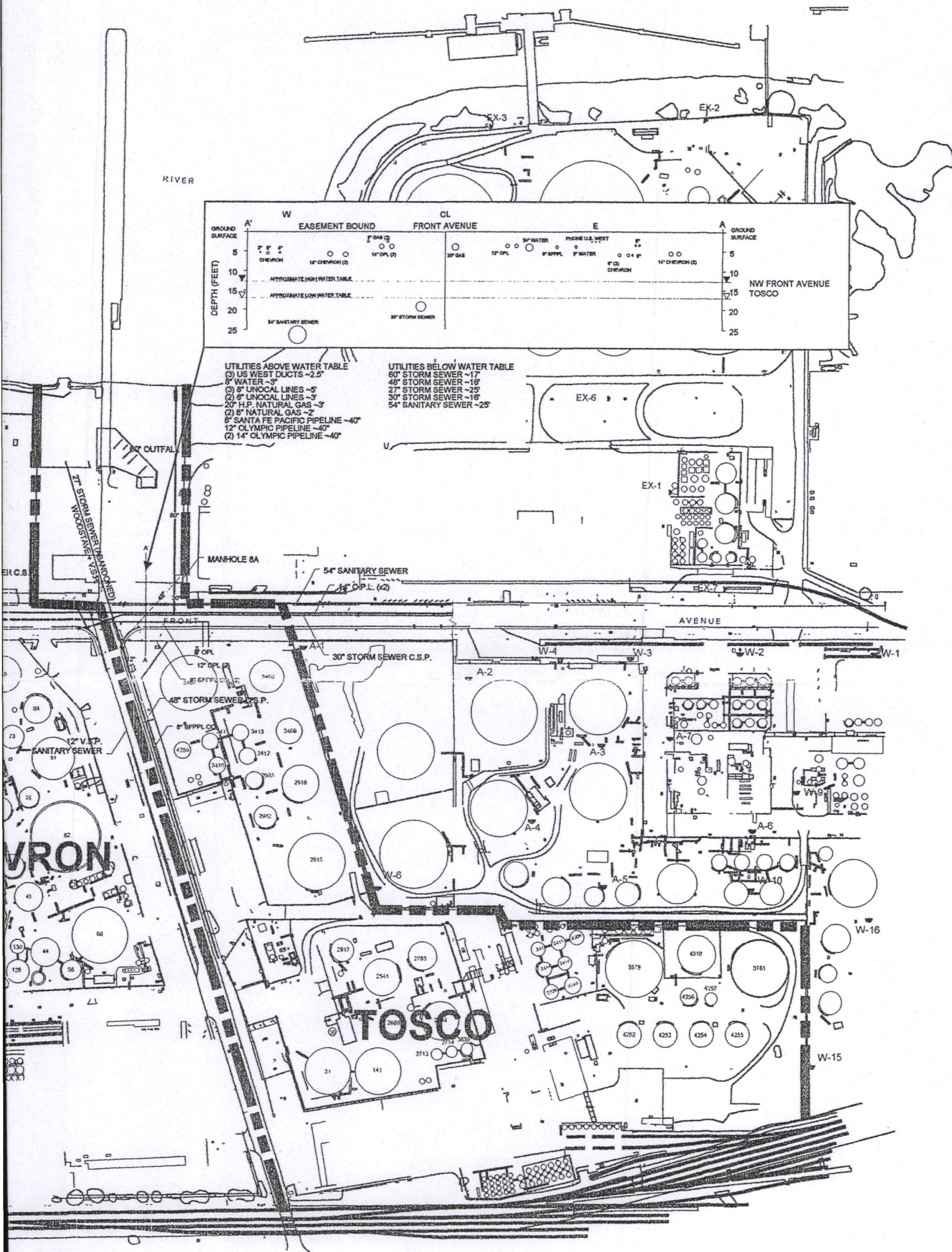
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FIG 37

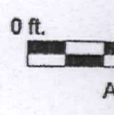
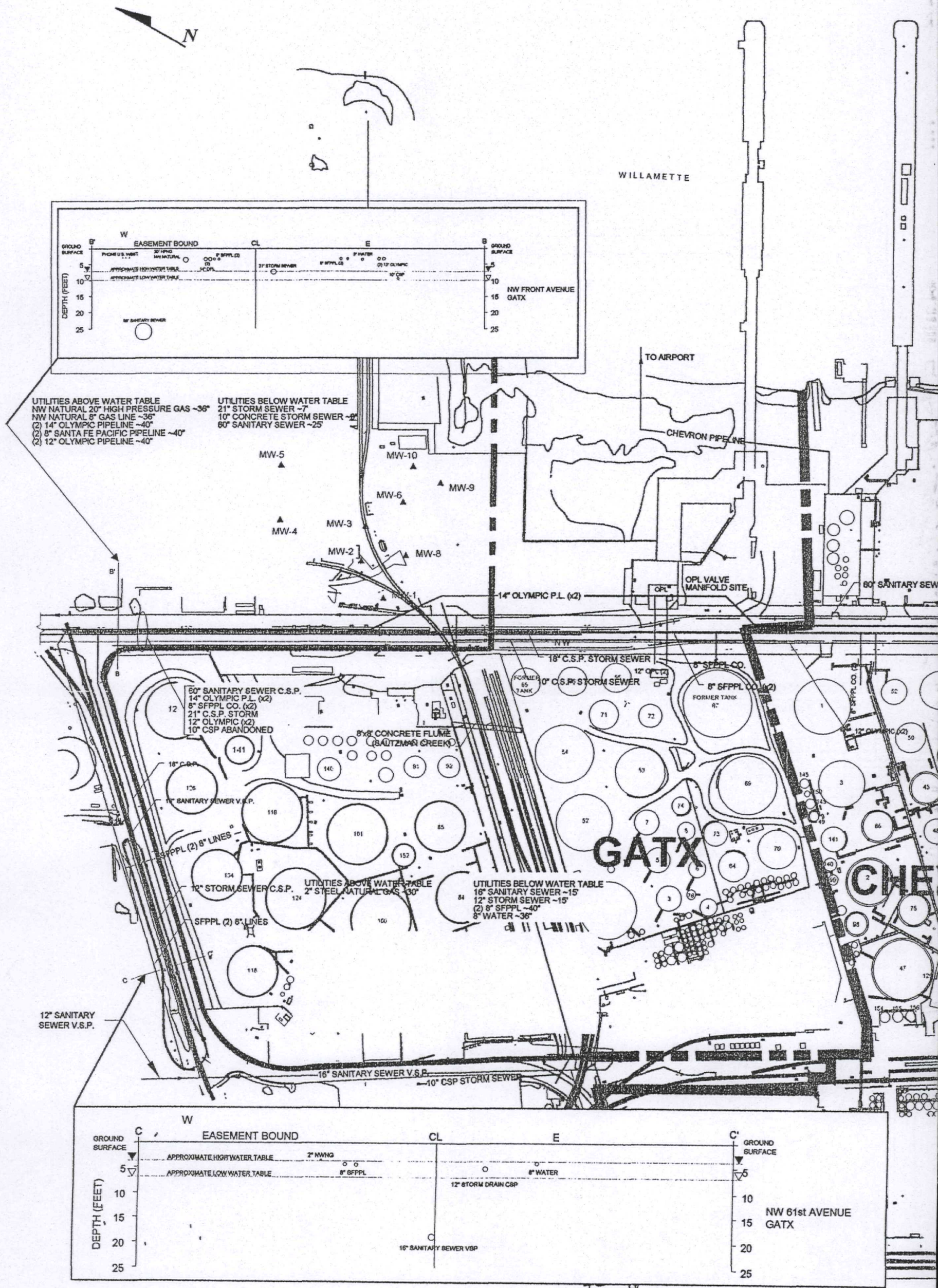




20 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

<b>KHM</b> ENVIRONMENTAL MANAGEMENT INC.	Remedial Investigation Utility Map		
	Willbridge Facility Remedial Investigation Portland, Oregon		
	DATE December 2000	PROJECT B17-01D	FIGURE 37









Portland Office

September 15, 1994

OPE39281.PM

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**ENVIRONMENTAL ENG**

Ms. Jill Kiernan, P.E.  
Oregon Department of Environmental Quality  
Waste Management and Cleanup  
811 S.W. 6th Avenue  
Portland, OR 97204

Subject: Willbridge RI/FS

Dear Jill:

This letter presents our quarterly progress report for the RI/FS work currently being performed at the Chevron/Unocal/Shell Willbridge facilities in Portland, Oregon. This report presents a summary of:

- Actions taken under the Consent Order during June through August 1994
- Action scheduled to be taken under the Consent Order during September through November 1994
- Sampling, test results, and any other data generated during June through August 1994; and
- A description of problems experienced during June through August 1994 and the manner in which they were resolved or are being addressed.

This progress report fulfills the requirement of Section 7F of Consent Order WMCSR-NWR-94-06.

### *Action Taken During June through August 1994*

The following work was performed during June through August 1994:

Serving Oregon and Southwest Washington from two locations:

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Corvallis Office 2300 N.W. Walnut Blvd., Corvallis, OR 97330-3538

503.235.5000  
503.752.4271

503.235.2445 FAX  
503.752.0276 FAX

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- Selection of Project Manager/Consultant for the project
- Began compiling and reviewing existing information
- Completed visual locating of existing groundwater monitoring wells
- Performed groundwater monitoring at the Chevron and Shell facilities

***Action Scheduled for September through November 1994***

The following actions are scheduled for September through November 1994:

- Meet with DEQ representatives on September 14, 1994 to discuss project kickoff
- Perform quarterly groundwater monitoring at all three facilities. Monitoring will be performed on the same day for all three facilities to better facilitate assessment of overall site groundwater gradients
- Visit site with DEQ representatives
- Prepare and submit outline of Interim Action Work Plan to DEQ. The outline will be submitted before October 28, 1994.
- Prepare and submit draft Interim Action Work Plan. The draft Work Plan will be submitted by November 18, 1994.

***Sampling, Test Results, and Data Generated During June through August 1994***

Results of quarterly groundwater monitoring performed during the reporting period at the Shell and Chevron facilities is attached.

***Problems Experienced During June through August 1994***

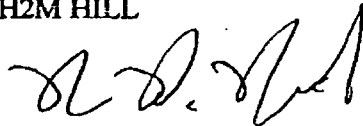
No significant problems were experienced during June through August 1994.

Ms. Jill Kiernan, P.E.  
Page 3  
September 15, 1994  
OPE39281.PM

Please call if you have any questions, (503) 235-5000.

Sincerely,

CH2M HILL



Ross D. Rieke, P.E.  
Project Manager

c: Tim Johnson, Chevron  
Joe Comstock, UNOCAL  
Rob Pace, Shell Oil  
Scott McKinley, CH2M HILL/CVO

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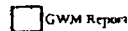
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Additional Instructions:

Fig 1, Fig 2 in B17-05K 2003 O&M, Excel File System  
Tabs Fig-1 & Fig-2

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February 11, 2003

Project Number: PTWB-05N-2.0001

Mr. Martin Cramer  
ConocoPhillips  
5528 NW Doane Avenue  
Portland, Oregon 97210

Mr. Gerald O'Regan  
Chevron Environmental Management Co.  
6001 Bollinger Canyon Road, Building L  
San Ramon, California 94583-5004

**RE: Progress Report  
Recovery System Modified Pumping Method  
ConocoPhillips Willbridge Terminal  
Portland, Oregon**

Dear Gentlemen:

Delta Environmental Consultants, Inc. (Delta) has prepared this letter to present the results of the system modification pilot test on the effect of groundwater extraction with minimal aeration of the water stream. The purpose of this work was to determine whether or not aeration of the extracted groundwater stream is increasing the maintenance required to keep the cutoff wall groundwater treatment system operational.

#### **BACKGROUND INFORMATION**

Groundwater is extracted from a series of six recovery wells behind the 60-inch storm sewer outfall cutoff wall. The groundwater treatment system consists of an oil/water separator, batch tank, transfer pump, filter canisters, and carbon vessels. It appears that iron precipitate is the primary media that plugs the filters and fouls the carbon vessels. Silt does not appear to be present in sufficient quantities to cause fouling in the system. Oxidation decreases the solubility of dissolved reduced iron and causes it to precipitate out of solution, forming precipitate crust on the filters and carbon beds. This fouling and buildup has resulted in the need for site visits three times per week to clean filters and backwash the carbon units. For this reason, Delta has investigated the effect of aeration of the water stream caused by the system operation. The down-well pneumatic pumps introduce a small amount of compressed air into the pumped waste stream during each pumping cycle aerating the water. In an attempt to stop this

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aeration and determine the results, Delta proposed a limited duration test utilizing pumps that would not introduce air into the pumped water.

### SCOPE OF WORK

Delta installed two surface-mounted one-inch air diaphragm pumps in place of the six pneumatic down-well total fluids pumps to reduce aeration. The diaphragm pumps were controlled with a float-actuated valve designed to control air diaphragm pumps. The float switch was mounted in the 12-inch observation sump located at the 60-inch storm sewer outfall. When activated, the pumps extracted groundwater through one-inch hoses attached to PVC stingers, which were placed in recovery wells RW-5 and RW-6 to a depth of approximately 15 feet below grade. The extracted water was then pumped into the same conveyance piping that typically feeds the remediation system.

The surface-mounted pumps were activated on July 2, 2003 and operated continuously until October 31, 2003. Over this time period maintenance visits were required at the same frequency as during the standard pumping regime due to fouling of the filters and carbon units. Field sheets were filled out each time maintenance was performed on the system. System flow rate, filter backpressure, carbon backpressure and qualitative observations are recorded on the field sheets.

### REDUCED AERATION PUMPING RESULTS

The data on the field sheets during the test period were entered into spreadsheets for the purpose of calculating and graphing the relationships between pumping method and system performance. Total flow through the system was relatively stable throughout the test period.

System throughput (total flow in gallons) with respect to rise in backpressure across the carbon vessels is presented in Figure 1. The negative values visible on the graph are an artifact of the pressure reading relative to atmosphere (gauge pressure). Regardless of carbon fouling, the backpressure may appear to decrease if the cartridge filters plug and restrict the flow to the carbon beds. This same situation can cause the apparent positive spikes in throughput per increase in backpressure across the carbon units. The values on Figure 1 represent gallons of groundwater processed through the system per unit rise in backpressure measured at the carbon vessel. Larger values would indicate more flow per unit rise in pressure (less fouling) while lower values indicate lower flow per unit rise in pressure (more fouling). The calculated values during the test period are very similar to those in the previous months.

Figure 2 shows system throughput with respect to rise in backpressure between the batch pump and cartridge filters. The figure illustrates volume of water processed through the system per incremental rise in backpressure. There is some interference due to the rise in pressure across the carbon vessels immediately following the canister filters; this carbon backpressure typically varies between 5 and 15 psi. Figure 2 is read in the same manner as Figure 1; higher values indicate more flow per unit rise in pressure across the cartridge filter vessels. During the test period, the calculated values

shown in the figure are not significantly different from the values for the several months before the pilot test. The lack of a trend toward increased or decreased flow during the test period suggests that there is not a benefit to reducing the aeration of the extracted groundwater stream.

Qualitative observations were made during each O & M field visit. During the test period, the color and texture of the fouling on the filter cartridges changed. When the down-well pumps are used, the loading on the filters is typically rust colored. While using the surface-mounted diaphragm pumps, the color of the material on the filters tended to be gray in color. In addition the material on the filters was more dense and in a thinner layer. While the characteristics of the filtered solids were different in appearance, the end results with regard to fouling and need for maintenance visits were similar; the filters need to be changed at two to three day intervals.

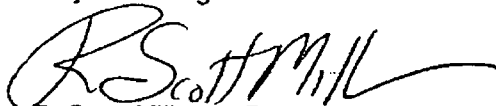
Throughout the test period, the filters required service and the carbon beds required back flushing three times per week. Though there may have been minor changes in the performance of the system during the test period, there is no indication that significant increases in system performance can be achieved by using different pump types.

Delta appreciates the opportunity to be of assistance to Chevron and ConocoPhillips on this project. If you need further information or have any questions, please call (503) 639-8098.

Sincerely,  
**Delta Environmental Consultants, Inc.**



Nate Hemphill  
Project Geologist



R. Scott Miller, P.E.  
Senior Engineer

Attachments: Figure 1 – Throughput Per Unit Rise in Pressure Across Carbon Vessels  
Figure 2 – Throughput Per Unit Rise in Pressure Across Cartridge Filters

cc: Mr. Gerry Koschal, Red Hills Environmental, Dundee, Oregon



Figure 1  
Throughput Per Unit Rise in Pressure Across Carbon Vessels

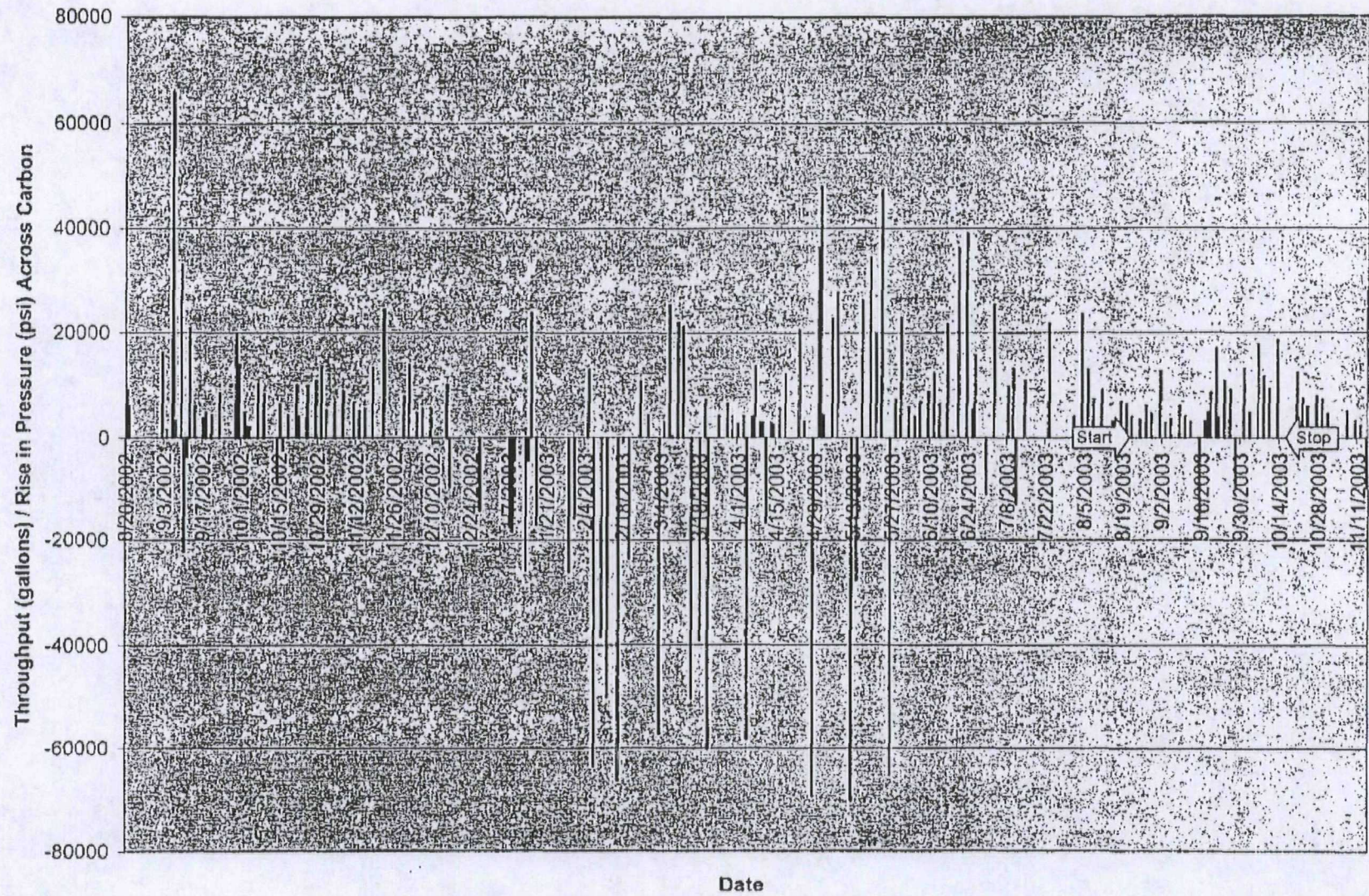
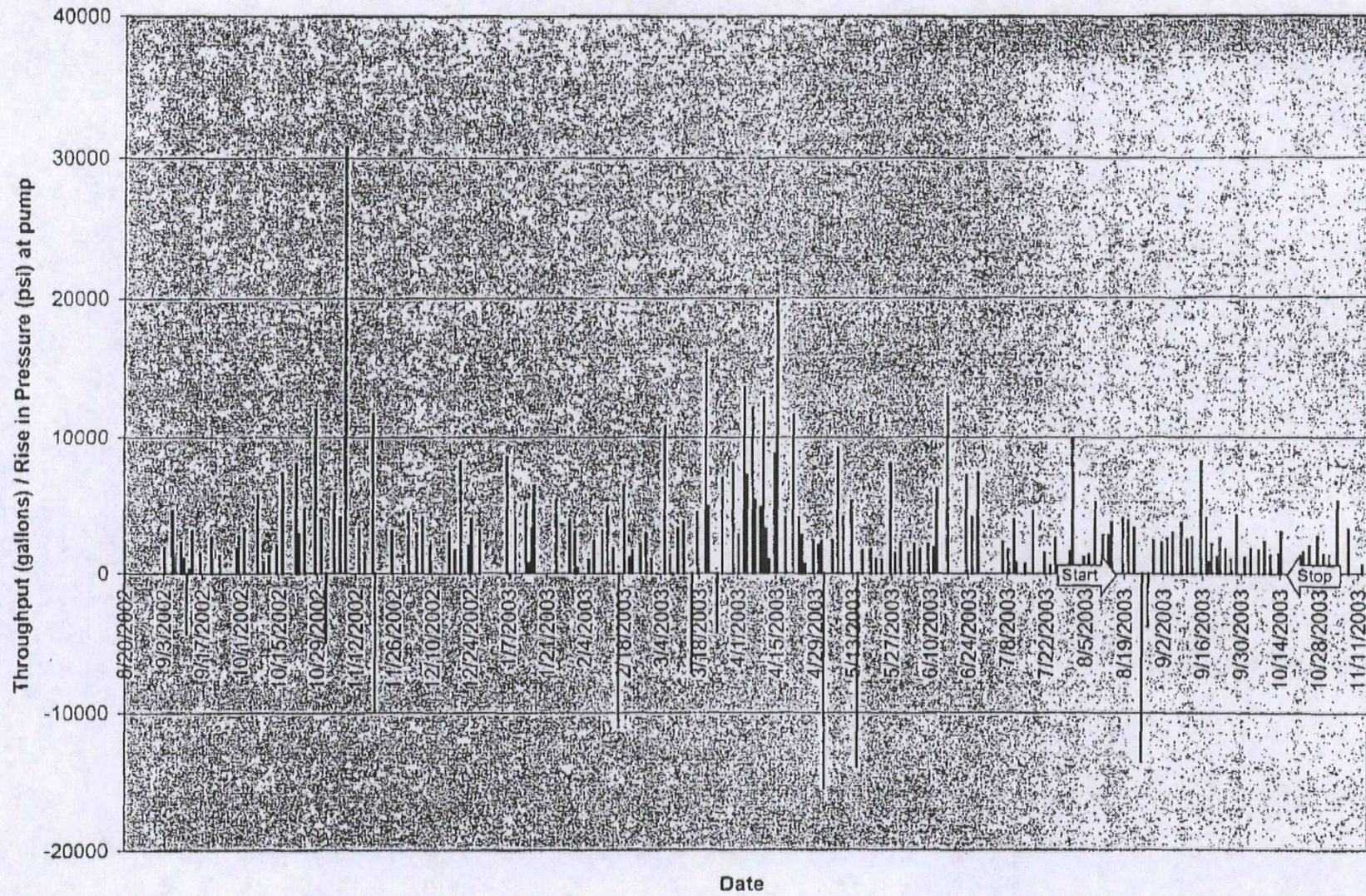




Figure 2  
Throughput Per Unit Rise in Pressure Across Cartridge Filters





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June 3, 2005

Mr. Martin Cramer  
ConocoPhillips  
5528 NW Doane Avenue  
Portland, Oregon 97210

Mr. Gerald O'Regan  
Chevron Environmental Management Co.  
6001 Bollinger Canyon Road, Building L  
San Ramon, California 94583-5004

RE: **Progress Report**  
**Recovery System Enhancement Test Results**  
**ConocoPhillips Willbridge Terminal**  
**Portland, Oregon**  
**Delta Project Number: PTWB-05N-2.0001**

Dear Gentlemen:

Delta Environmental Consultants, Inc. (Delta) has prepared this letter to present the results of system modification pilot tests intended to reduce iron fouling and reduce system maintenance requirements for the 60-inch diameter storm sewer cut-off wall pump and treat system located on the ConocoPhillips property at the Willbridge terminals, Portland, Oregon. Tests completed to date are airless pumping, acid washed carbon, the installation of a sand filter vessel immediately prior to the existing carbon vessels, and the injection of an iron sequestering chemical solution into the process flow. The purpose of these tests was to assess whether maintenance required to keep the cutoff wall groundwater treatment system operational could be reduced by reducing the iron fouling in the carbon beds. Fouling of the carbon beds is the system maintenance issue requiring the most labor and materials during site visits (carbon backwashing and carbon change-outs).

### **BACKGROUND INFORMATION**

The cutoff wall is a "U"-shaped steel interlocking sheet pile wall that encompasses the 60-inch storm water pipe and pipe bedding material near the outfall at the Willamette River. Groundwater is extracted from a series of six recovery wells behind the 60-inch storm sewer outfall cutoff wall. The groundwater treatment system consists of an oil/water separator, batch tank, transfer pumps and carbon filtration vessels. It appears that iron precipitate is the primary media that fouls the carbon vessels. As the groundwater is extracted from behind the cut-off wall and pumped through the treatment system, the chemistry of the water changes sufficiently that dissolved iron precipitates

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from the solution. This resulting precipitate forms a crust on the tanks, hoses and carbon beds. The iron precipitate buildup results in the need for site visits two to three times per week to backwash the carbon units and maintain the system. For this reason, Delta has tested alternative methods to reduce maintenance on this system.

## **PREVIOUSLY COMPLETED TESTING AND RESULTS**

### **Airless Pumping Pilot Test**

For the duration of the test, the down-well pneumatic pumps were turned off and surface-mounted diaphragm pumps were activated to reduce the contact between air (used with the down-well pumps) and recovered groundwater. The surface-mounted pumps were operated continuously from July 2, 2003 until October 31, 2003. The results of this pilot study were documented in the February 11, 2004 letter titled: *Recovery System Modified Pumping Method* (Attachment A). The conclusion being that the modified pumping method did not result in reducing buildup of precipitate nor reduce system maintenance requirements.

## **SCOPE OF TESTING COMPLETED**

### **JP-7 Chemical Injection Test**

The first pilot test under this scope used a sequestering agent to retain the iron in solution. The agent used was Jeager Products JP-7 (JP-7) sequestering agent. The MSDS for the JP-7 is attached (Attachment B). On June 22, 2004 Delta installed and started the chemical metering pump and associated tubing required for the chemical injection test. Sequestering agent was metered through a check valve assembly into a 4-inch by 28-inch static mixing chamber installed before the oil/water separator. The JP-7 treated water then flowed into the same conveyance piping as the remediation system water. JP-7 solution was pumped from a 15-gallon drum located in the asphalt warehouse through double-contained polyethylene tubing into the treatment system process stream at approximately 2.7 gallons per day (0.11 gallon per hour). This metering rate was based on the information provided from the manufacturer to help keep iron in solution. The test was stopped when the first drum was nearly empty on July 2, 2004, a test period of approximately ten days.

On October 19, 2004, another test was started with an increased JP-7 injection rate. Thirty-three gallons of JP-7 was added to the process flow over a period of 5.5 days at a rate of approximately 6 gallons per day (0.25 gallons per hour), approximately double the previous metering rate.

Over this time period, maintenance visits continued at the same frequency as during the standard pumping regime. Field sheets were completed each time maintenance was performed on the system. System flow rate, pump backpressure and carbon backpressure was recorded and qualitative observations have been made on the field sheets. Results and observations are presented below.

## **Sand Filtration Pilot Test**

Two pilot tests were conducted, each using different media in a small temporary sand filter. The temporary filter has a surface area of approximately three square feet and was plumbed into the treatment system between the batch pumps and the carbon filter vessels. Hoses with cam-and-groove fittings were used to divert the system flow to and from the sand filter. A pressure relief valve was calibrated and installed in order to prevent over-pressurizing the temporary filter vessel.

On December 17, 2003 through December 19, 2003 a short term filtration test was conducted using 300 pounds of approximately 0.5 millimeter crushed silica sand. The crushed sand has irregularly shaped angular granules that pack tightly with low pore space. After each 24-hour test period, the filter vessel was disassembled and the surface of the sand was visually inspected for iron precipitate buildup.

For the second stage of the sand filter test, the vessel was cleaned and 300 pounds of approximately 0.5 millimeter red garnet sand was loaded into the filter vessel. The garnet sand is semi-spherical in shape and forms a filter bed with a regular structure and more open pore space than crushed silica sand. Using a media with more open pore structure allows deeper penetration of the filtrate into the filter bed and less 'blinding over'. On January 27, 2004, December 13, 2005 and January 3, 2005 the garnet sand filter was operated for three 24-hour test periods. During the first of these test periods, an internal part of the sand filter cracked and bypassed the water stream past the sand filtration bed. The filter was repaired for the remainder of the test.

## **Acid Washed Carbon Test**

At several carbon changes the vessels were filled with virgin acid-washed activated carbon. The acid-washed carbon has a lower pH because the ash normally associated with the carbon has been washed out or neutralized. It was suspected that the alkalinity of the carbon might be causing an increased amount of iron to precipitate in the carbon beds, however, after studying the life span of the carbon it was determined that there was little or no functional difference between reactivated carbon and the more costly virgin acid-washed product.

Carbon with larger sized granules was loaded into the vessels for several consecutive carbon changes to test the premise that the coarser filter-bed might allow the iron solids to penetrate deeper and effectively create a larger surface area to retain the iron solids. The coarser carbon (6 x 12 mesh size) did noticeably decrease the rate of iron fouling.

## **RESULTS**

Assessment of the effectiveness of the iron precipitate control method was primarily based on changes in carbon backwashing requirements and rate of back-pressure increase on various system components. Data from the different test periods was recorded onto daily operation and maintenance field sheets. Information included pressure readings, system performance, system configuration and qualitative

observations. Total flow through the system during each of the test periods was relatively stable.

### JP-7 Chemical Injection Test

The first stage of the JP-7 Chemical injection test was run for ten consecutive days. During that time, the required maintenance (backwashing of carbon) on the system and the system flow rate was similar to the week before and after the pilot test period. Carbon backwashing was necessary to keep the system operational on three of the four inspections during the test. Backpressure due to fouling of the carbon beds increased between each visit from 19 to 29 pounds per square inch (psi) with an average increase of approximately 24 psi during the test. This is comparable to the 27 psi average increase for the four visits following the test and is significantly greater than the 11 psi average increase measured between the four visits prior to the test period (see table below). The increasing trend is consistent with 'normal behavior' observed as the carbon beds gradually become more loaded with precipitate. There was no marked improvement during either of the two JP-7 injection tests.

#### First JP-7 Pilot Test

	Prior to Test Period			Test Period						After to Test Period	
	6/14	6/17	6/18	6/22	6/25	6/28	7/2	7/6	7/9	7/12	7/16
Pressure Increase in psi (since previous visit)	17	9	5	11	23	19	39	30	8	37	34
Carbon Back-flushed? (Yes/No)	N	N	N	Y	N	Y	Y	N	Y	Y	N

#### Second JP-7 Pilot Test

	Prior to Test Period			Test Period				After to Test Period			
	10/7	10/11	10/14	10/19	10/21	10/22	10/25	10/29	11/1	11/5	11/8
Pressure Increase in psi (since previous visit)	13	29	36	63	44	10	37	36	18	73	58
Carbon Back-flushed? (Yes/No)	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y

### Sand Filtration Pilot Test

Both silica sand and garnet sand were tested using the temporary filter vessel. At the end of the first stage of the silica-sand filter pilot test was run, the pressure drop across the sand filter was 23 psi. The pressure drop across the filter vessel was 41 psi after the second time interval. The pressure drops for the garnet sand tests were 24 and 35 psi after the two 24 hour periods. The increased backpressure caused the pressure

relief valve to open to varying degrees in each of the pilot tests, indicating that the entire water flow could not be processed without over-pressuring the vessel in less than 24 hours, opening the pressure relief valve. Opening of the pressure relief valve causes the pressure rise to appear smaller than it would actually be if the filter had handled the entire water flow that the extraction pumps generated.

The iron sediment appears to collect primarily on the surface of the sand. While increased volume would surely improve performance, increased surface area would appear to be the key factor in extending the operating time of the filter unit. The surface area of the test vessel is approximately 3 square feet compared to the 48-inch diameter of a standard full sized pressure vessel with approximately 12.5 ft<sup>2</sup> of surface area.

Pressure across the carbon beds increased during each of the sand filter pilot test runs. Each test period was approximately 24 hours and the pressure rise ranged from 8 to 18 psi. While these recorded values are not large, they are only slightly lower than the pressure rise noted in the first 24 hours of carbon bed operation without a cartridge or sand filter in place. This indicates that the sand filter was not capturing all of the iron precipitate and that the carbon beds were still being fouled by this precipitate.

## CONCLUSIONS

Throughout the Jeager JP-7 additive test period, the carbon beds required back flushing one to two times per week. The observed pressure increases before and after each test cycle show gradual increase in operating pressure. Though there may have been minor changes in the performance of the system during the test period, there is no indication that significant increases in system performance can be achieved by using the Jeager JP-7 additive.

Based on the two types of sand filter media tested, sand filtration does appear to capture some of the iron, but may not significantly reduce system labor requirements when compared to the current system configuration. The iron sediment appears to collect primarily on the surface of the sand. While increased sand filter vessel volume would improve performance, increased surface area would appear to be the key factor in extending the operating time of the filter unit. The surface area of the test vessel is approximately three square feet. A standard size 48-inch diameter pressure vessel has approximately 12.5 ft<sup>2</sup> of surface area. If a full size filter unit with four times the surface area of the test unit was put into service, it would follow that a pressure rise of approximately 30 psi would be observed in the first five days of sand filter operation.

## RECOMMENDATIONS

Delta recommends further investigation into technologies or techniques that will reduce maintenance and increased reliability of the cutoff wall groundwater treatment system. At present, the carbon vessels are being operated without pre-filters in place, saving labor and expense of changing filters while only minimally reducing the carbon life span. The current system configuration requires weekly or twice weekly backwashing of the carbon unit. By reducing the amount of iron loading to the carbon vessels, the carbon

life will be extended and the number of site O&M visits for carbon backwashing could be reduced.

Filtration was the first iron removal method utilized. This proved costly and did not result in carbon backwashing requirements. Several methods have been explored to assess keeping iron solids in suspension through the treatment process. These include groundwater extraction with minimal aeration (airless pumping, see Attachment A, Letter titled: *Progress Report Recovery System Modified Pumping Method*), virgin acid washed carbon and 6 x 12 (coarse) carbon installed at several carbon changes and the addition of Jeager JP-7 sequestering agent. None of these methods for keeping the iron in solution have proven effective. The next approach is removing the iron from solution and removing it as a solid or sludge. Delta proposes testing the effectiveness of a settling tank, allowing the solids to precipitate and settle out of suspension prior to carbon treatment.


Testing the approach of settling the solids in a large tank is relatively simple to set up and may have several beneficial effects. By installing a temporary settling tank, we can increase residence time and promote settling of solids. The low flow energy environment in the tank will promote coalescing of separate phase hydrocarbons (SPH) and prevent the SPH from passing through the batch tank and on to the carbon vessels. For the duration of the proposed test a portable trailer-mounted tank would be used to replace the existing oil/water separator. As a secondary test, slight aeration can be applied to the water stream in conjunction with the usage of the proposed large settling tank. A series of baffles and weirs will be installed in the tank to capture SPH and diffuse the flow of water through the tank.

By decreasing the iron loading to the carbon vessels, carbon life will be extended and associated labor like backwashing and carbon changes can be reduced. The actual volume of iron sediment that is likely to accumulate in the tank during the test is unknown and will be measured and removed at the end of the test period during the tank cleaning process. Waste disposal costs are anticipated to be comparable to the present configuration.

Delta is requesting permission to complete mobilization of a large temporary tank to complete this proposed testing. Costs are estimated to be approximately \$1500 for mob, setup and demobilization; \$1350 per month tank rental and \$1500 cleaning at the end of the test period. Work will be completed under the existing approved O&M budget.

Delta appreciates the opportunity to be of assistance to Chevron-Texaco and ConocoPhillips on this project. If you need further information or have any questions, please call (503) 639-8098.

Sincerely,  
**Delta Environmental Consultants, Inc.**

  
Nate Hemphill  
Project Geologist

  
R. Scott Miller, P.E.  
Senior Engineer

Attachments: Attachment A - February 11, 2004 letter titled: Recovery  
System Modified Pumping Method  
Attachment B - Jeager Products JP-7 MSDS

cc: Mr. Gerry Koschal, Red Hills Environmental, Dundee, Oregon



## **ATTACHMENT A**

---

**FEBRUARY 11, 2004 LETTER TITLED: RECOVERY SYSTEM  
MODIFIED PUMPING METHOD**



*Solving environment-related business problems worldwide*

[www.deltaenv.com](http://www.deltaenv.com)

7150 SW Hampton • Suite 220

Tigard, Oregon 97223 USA

503.639.8098 800.477.7411

Fax 503.639.7619

February 11, 2003

Project Number: PTWB-05N-2.0001

Mr. Martin Cramer  
ConocoPhillips  
5528 NW Doane Avenue  
Portland, Oregon 97210

Mr. Gerald O'Regan  
Chevron Environmental Management Co.  
6001 Bollinger Canyon Road, Building L  
San Ramon, California 94583-5004

RE: Progress Report  
Recovery System Modified Pumping Method  
ConocoPhillips Willbridge Terminal  
Portland, Oregon

Dear Gentlemen:

Delta Environmental Consultants, Inc. (Delta) has prepared this letter to present the results of the system modification pilot test on the effect of groundwater extraction with minimal aeration of the water stream. The purpose of this work was to determine whether or not aeration of the extracted groundwater stream is increasing the maintenance required to keep the cutoff wall groundwater treatment system operational.

#### **BACKGROUND INFORMATION**

Groundwater is extracted from a series of six recovery wells behind the 60-inch storm sewer outfall cutoff wall. The groundwater treatment system consists of an oil/water separator, batch tank, transfer pump, filter canisters, and carbon vessels. It appears that iron precipitate is the primary media that plugs the filters and fouls the carbon vessels. Silt does not appear to be present in sufficient quantities to cause fouling in the system. Oxidation decreases the solubility of dissolved reduced iron and causes it to precipitate out of solution, forming precipitate crust on the filters and carbon beds. This fouling and buildup has resulted in the need for site visits three times per week to clean filters and backwash the carbon units. For this reason, Delta has investigated the effect of aeration of the water stream caused by the system operation. The down-well pneumatic pumps introduce a small amount of compressed air into the pumped waste stream during each pumping cycle aerating the water. In an attempt to stop this

A member of:  
 **Inogen**  
Environmental Alliance

COPPOR00012696

aeration and determine the results, Delta proposed a limited duration test utilizing pumps that would not introduce air into the pumped water.

### SCOPE OF WORK

Delta installed two surface-mounted one-inch air diaphragm pumps in place of the six pneumatic down-well total fluids pumps to reduce aeration. The diaphragm pumps were controlled with a float-actuated valve designed to control air diaphragm pumps.

The float switch was mounted in the 12-inch observation sump located at the 60-inch storm sewer outfall. When activated, the pumps extracted groundwater through one-inch hoses attached to PVC stingers, which were placed in recovery wells RW-5 and RW-6 to a depth of approximately 15 feet below grade. The extracted water was then pumped into the same conveyance piping that typically feeds the remediation system.

The surface-mounted pumps were activated on July 2, 2003 and operated continuously until October 31, 2003. Over this time period maintenance visits were required at the same frequency as during the standard pumping regime due to fouling of the filters and carbon units. Field sheets were filled out each time maintenance was performed on the system. System flow rate, filter backpressure, carbon backpressure and qualitative observations are recorded on the field sheets.

### REDUCED AERATION PUMPING RESULTS

The data on the field sheets during the test period were entered into spreadsheets for the purpose of calculating and graphing the relationships between pumping method and system performance. Total flow through the system was relatively stable throughout the test period.

System throughput (total flow in gallons) with respect to rise in backpressure across the carbon vessels is presented in Figure 1. The negative values visible on the graph are an artifact of the pressure reading relative to atmosphere (gauge pressure). Regardless of carbon fouling, the backpressure may appear to decrease if the cartridge filters plug and restrict the flow to the carbon beds. This same situation can cause the apparent positive spikes in throughput per increase in backpressure across the carbon units. The values on Figure 1 represent gallons of groundwater processed through the system per unit rise in backpressure measured at the carbon vessel. Larger values would indicate more flow per unit rise in pressure (less fouling) while lower values indicate lower flow per unit rise in pressure (more fouling). The calculated values during the test period are very similar to those in the previous months.

Figure 2 shows system throughput with respect to rise in backpressure between the batch pump and cartridge filters. The figure illustrates volume of water processed through the system per incremental rise in backpressure. There is some interference due to the rise in pressure across the carbon vessels immediately following the canister filters; this carbon backpressure typically varies between 5 and 15 psi. Figure 2 is read in the same manner as Figure 1; higher values indicate more flow per unit rise in pressure across the cartridge filter vessels. During the test period, the calculated values

shown in the figure are not significantly different from the values for the several months before the pilot test. The lack of a trend toward increased or decreased flow during the test period suggests that there is not a benefit to reducing the aeration of the extracted groundwater stream.

Qualitative observations were made during each O & M field visit. During the test period, the color and texture of the fouling on the filter cartridges changed. When the down-well pumps are used, the loading on the filters is typically rust colored. While using the surface-mounted diaphragm pumps, the color of the material on the filters tended to be gray in color. In addition the material on the filters was more dense and in a thinner layer. While the characteristics of the filtered solids were different in appearance, the end results with regard to fouling and need for maintenance visits were similar; the filters need to be changed at two to three day intervals.

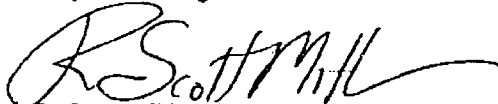
Throughout the test period, the filters required service and the carbon beds required back flushing three times per week. Though there may have been minor changes in the performance of the system during the test period, there is no indication that significant increases in system performance can be achieved by using different pump types.

Delta appreciates the opportunity to be of assistance to Chevron and ConocoPhillips on this project. If you need further information or have any questions, please call (503) 639-8098.

Sincerely,  
**Delta Environmental Consultants, Inc.**



Nate Hemphill  
Project Geologist



R. Scott Miller, P.E.  
Senior Engineer

Attachments: Figure 1 – Throughput Per Unit Rise in Pressure Across Carbon Vessels  
Figure 2 – Throughput Per Unit Rise in Pressure Across Cartridge Filters

cc: Mr. Gerry Koschal, Red Hills Environmental, Dundee, Oregon



Figure 1  
Throughput Per Unit Rise in Pressure Across Carbon Vessels

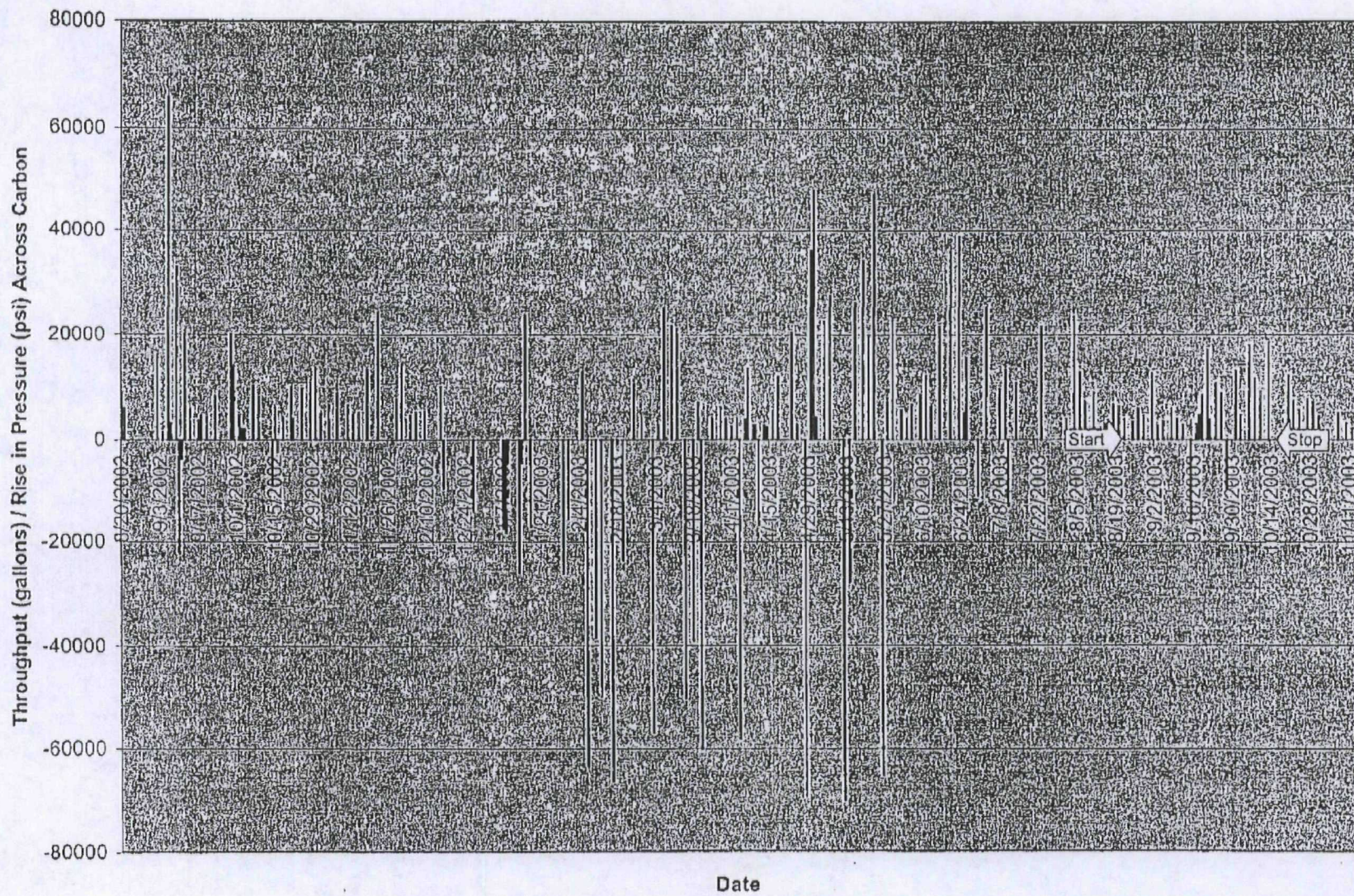
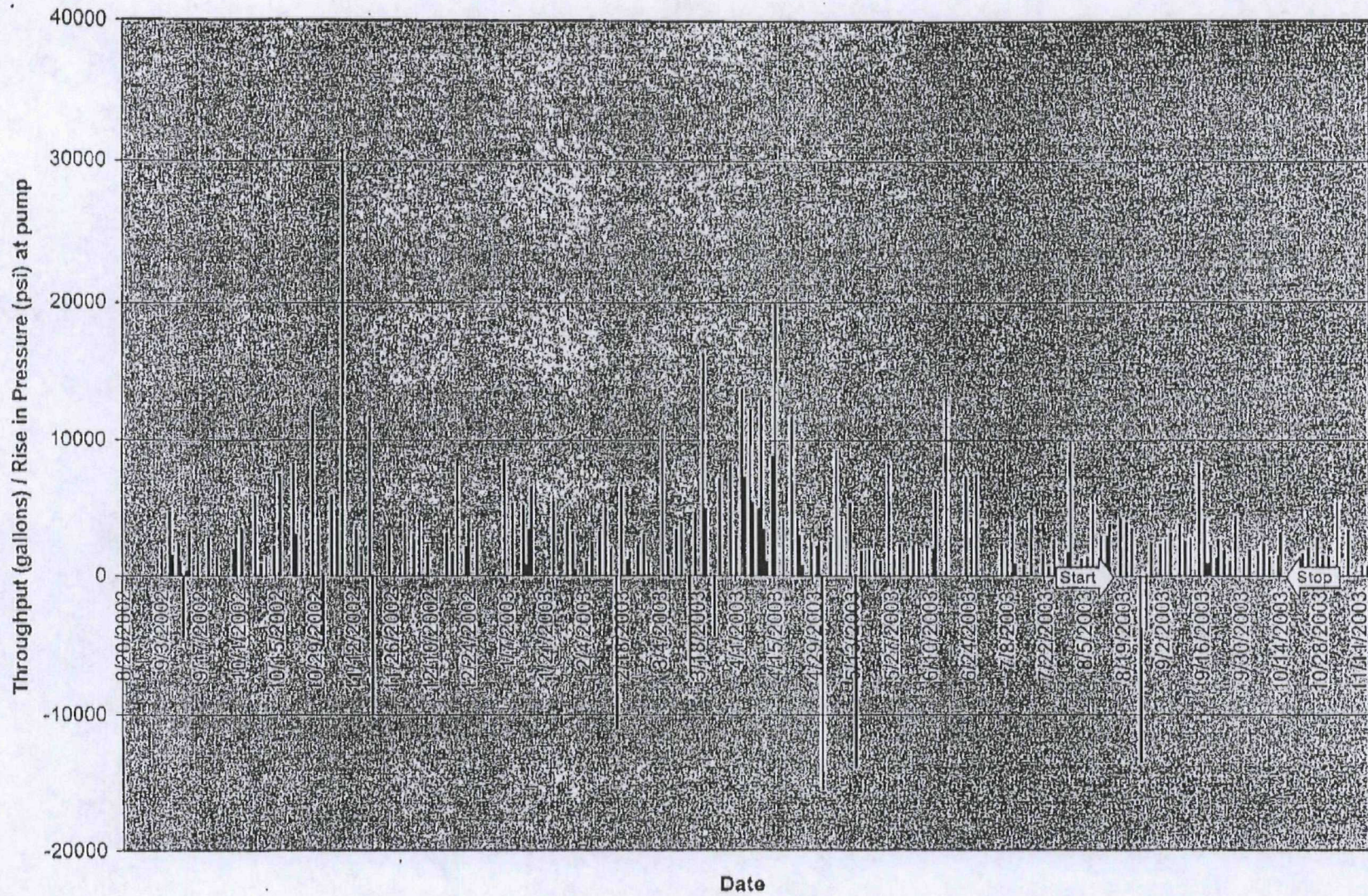




Figure 2  
Throughput Per Unit Rise in Pressure Across Cartridge Filters





## **ATTACHMENT B**

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### **JEAGER PRODUCTS JP-7 MSDS**

**Material Safety Data Sheet**

Jaeger Products, Inc  
1611 Peachleaf  
Houston, TX 77039  
(281)449-9500

**Product Name: JP-7****Fire and Explosion Data**

Flash Point:	Non-Combustible
Flammable Limits:	
Upper	Not Applicable
Lower	Not Applicable
Extinguishing Media:	Not Applicable
Special Fire Fighting Procedures:	Not Applicable
Unusual Fire & Explosion Hazards:	None

**Reactivity Data**

Stability:	Stable
Incompatibility:	Concentrated Chlorine and Concentrated Mineral Acids
Hazard Polymerization:	Will not occur
Conditions to Avoid:	Direct mixing of concentrates and Mineral Acids
Hazardous Decomposition By-Products:	Heath Chlorine and Sulfur Dioxides

**Health Hazard Data**

Routes of Exposure-	
Eyes:	No published data
Skin Contact:	No published data
Skin Absorption:	No published data
Inhalation:	No published data
Ingestion:	No published data
Effects of Overexposure-	
Acute Exposure:	No published data
Chronic Exposure:	When good industrial hygiene practices are followed, no significant inhalation hazard or skin irritation.
Other Health Effects-	
Medical Conditions	
Aggravated by Exposure:	None Known
Carcinogenic Potential:	
NTP Annual Report:	Not listed
IARC Monographs:	Not listed
OSHA 29CFR Part 1910 Sub Z:	Not listed



JAEGER PRODUCTS, INC.  
1611 PEACH LEAF  
HOUSTON, TEXAS 77039  
(281) 449-9500

Date Prepared: June 18, 1986      Last Revision: March 1996

Synonyms:	Sodium Phosphate
Chemical Family:	Liquid Polyphosphate
Formula:	Proprietary
Maximum Use:	30.0 mg/l

Precautionary Statement: No Significant Health Effects reported from manufacturing locations.  
(As defined by OSHA Hazard Communications Standard)

Chemical Identity:	Sodium Polyphosphate
OSHA PEL:	Not Listed
ACGIH TLV:	Not Listed
CAS#:	68915-31-1
Hazard Class:	None

Boiling Point:	Above 212 degrees F.
Melting Point:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density (Air = 1):	Not Applicable
Specific Gravity (H2O = 1):	1.367
Evaporation Rate	
(Butyl Acetate = 1):	Non-Volatile
Solubility in Water by Weight:	Complete
pH (neat):	5.2 +/- .5
Appearance:	Clear Liquid
Odor:	Slight

**MATERIAL SAFETY DATA SHEET**

**JAEGER PRODUCTS, INC.  
1611 PEACH LEAF  
HOUSTON, TEXAS 77039  
(281) 449-9500**

**Product Name: JP-7**

**=====MANUFACTURER'S DISCLAIMER=====**

While the Jaeger Products, Inc. will make every effort to insure the validity of this information, we must rely on the information supplied to us by our suppliers and thus make no warranty express or implied as to the validity of this data.

Any use of this product or method of application which is not described in the Product Data Sheet is the responsibility of the user.



**Manifest Authority Assignment Letter**

ConocoPhillips  
Risk Management & Remediation  
Office Street Address  
1230 W. Washington Street  
Suite 212  
Tempe, AZ 85281  
(602) 452-2505

Mr. Brian Pletcher  
Delta Consultants, Inc.  
7150 SW Hampton Street, Suite 220  
Tigard, Oregon 97223

RE: Disposal of wastes on behalf of ConocoPhillips Risk Management and Remediation (RM&R) Group

Dear Mr. Pletcher:

Pursuant to the current Master Services Agreement (Contract # 2003-GPS-MSA-NC-062) between ConocoPhillips and Delta Consultants, Inc. (Delta), Delta is performing certain activities related to the possible management of wastes at RM&R project site(s) in Oregon and Washington. These activities may result in the generation of hazardous and/or non-hazardous wastes that must be appropriately managed and transported offsite to a ConocoPhillips approved waste management facility for treatment, storage or disposal in compliance with applicable state and federal regulatory requirements.

ConocoPhillips Risk Management and Remediation Group delegates the limited authority to Delta for the purpose of preparing and signing waste manifests or shipping papers, subject to the terms and conditions of this agreement and the applicable Master Service Agreement (MSA). ConocoPhillips understands and acknowledges that Delta may delegate specified authority to authorized subcontractors, however, Delta's use of subcontractors shall be governed by the applicable provisions of the MSA. Only the following Company employees are authorized to sign said documents for Oregon and Washington States: Cale Fleming, Aric Frohman. Provided Delta fulfills the requirements of the MSA and RM&R Management System Section 6.2.4 requirements for waste management, ConocoPhillips will indemnify, defend and hold harmless Delta, its officers, directors and employees from and against any and all claims, damages, losses, expenses and other liabilities arising from the rights herein granted unless Delta is negligent or willfully wrong in its signing.

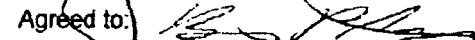
The designated Contractor employee(s) shall review RM&R's Management System Section on Waste Management and follow the procedures described therein, as well as the attached procedure. The Contractor certifies by signing under "Agreed to" section below, that the designated Contractor employee(s) shall have all necessary training to perform this work.

Please return a signed copy of this letter to me signifying agreement with this procedure prior to transporting any waste from ConocoPhillips site(s). In addition, please upload any completed manifests to the EDMS project file, and verify they have been uploaded.

Thank you for providing this service. If you have any questions please contact me at (602) 452 - 2505.

Sincerely,

  
Myron Smith  
ConocoPhillips Site/Project Manager

Agreed to: 

By: Brian Pletcher

Position: Senior Project Manager

Date: 3-15-07



# Oregon

Theodore Kulongoski, Governor

## Department of Environmental Quality

Northwest Region Portland Office  
2020 SW 4<sup>th</sup> Avenue, Suite 400  
Portland, OR 97201-4987  
(503) 229-5263  
FAX (503) 229-6945  
TTY (503) 229-5471

July 31, 2007

Brian Pletcher, R.G.  
Project Manager  
Delta Environmental, Inc  
7150 SW Hampton, Suite, 220  
Portland, Oregon 97223

Re: Approval of Storm Water Evaluation Work Plan, Chevron Willbridge Distribution Center

Dear Brian:

Thank you for your patience on our review time during the Willbridge project team transitions and the preliminary work on the leaking stormwater lines conducted by Conoco Phillips. DEQ has completed its review of the *Conoco-Phillips Willbridge Storm Water Evaluation Work Plan* dated October 2006. The workplan presents a comprehensive approach to evaluating the stormwater component of the Source Control Evaluation for the site and generally follows all the requirements of the Joint Source Control Strategy.

The City of Portland BES provided a review and comment letter on the workplan which I have already forwarded to your attention. DEQ is in general concurrence with the City's work plan comments on Section 2.4.3, Section 4.0, Section 5.1, Section 6.1, Section 6.2, and the comments on the Site Figures included in the workplan. Please incorporate the city's suggestions into the workplan and reporting. In addition to the comments provided by the City, DEQ has the following general and specific comments:

### General Comments

1. At least 4 rounds of stormwater samples should be collected from the locations identified in the workplan regardless of the catchbasin sediment sampling results.
2. The number of catch basins selected for sediment sampling is limited. Please be sure to include the additional catch basin sample locations suggested by the City of Portland and reevaluate the selected locations in the workplan in order to ensure all that site operations and uses are adequately represented. Pay particular attention to the areas outside of the contained tank farms that do not flow through the 3 stormwater oil-water separators on the site.
3. Please ensure that all PAH compounds listed in the JSCS SLV Table 3.1 are included in both the catchbasin sediment and stormwater samples.
4. Facility stormwater system figures should be modified to include flow direction arrows and any new stormwater infrastructure information that has been gathered since the preparation of the workplan.

### **Specific Comments**

#### **Section 5.1 Catch Basin Sampling Locations**

Please select a representative catch basin or two for sediment sampling from the "untreated" warehouse area shown on Figure 4.

#### **Section 6.1 Stormwater Sampling Locations**

Please select a representative stormwater sampling location in the "untreated" warehouse area shown on figure 4. The samples should be collected before the connection with the 48" stormwater line and capture stormwater from the roof of the warehouse.

#### **Section 6.5 Screening Evaluation and Reporting**

Please submit collected stormwater data with the regularly scheduled quarterly reports in a screening table/spreadsheet. MS Excel format is preferred and the table should have the exceedences of the applicable JSCS SLVs highlighted. A discussion of the results can be saved for the final summary report.

DEQ approves the Storm Water Evaluation Work Plan on the understanding that the preceding comments and suggested changes will be incorporated prior to the workplan being implemented. Changes to the workplan and modifications to the figures can be submitted with the catch basin sampling report or first stormwater sampling data submittal to DEQ. Also, be sure to coordinate with the BES regarding any drainage system reconnaissance and any discharge of investigation derived wastewater to the sanitary sewer as necessary.

Feel free to contact me at (503) 229-5563 or [Romero.Mike@deq.state.or.us](mailto:Romero.Mike@deq.state.or.us) if you have any questions regarding this letter or the project in general.

Sincerely,

Michael Romero, Project Manager  
Lower Willamette Section

cc: Henning Larsen, Cleanup and Site Response  
Karen Tarnow, Lower Willamette Section  
Michael Knoll, Conoco Phillips  
ECSI File #1549



# DELTA

## Document Control Sheet

DUE DATE	
Due to PM: <u>3-9</u>	Due to Client: <u>3-12-07</u>
Regulatory Deadline: _____	Other: _____

Client Name: <u>COP</u>	Author: _____	PM: <u>BSP</u>
Site: <u>Willbridge</u>	Job No. <u>PTWB01M.003</u>	Time Allotted to Complete: _____
Document Title: _____		
File Name and Network Subdirectory Containing Your Files: <u>Willbridge/DER media 2007/DER meeting Sch 3-9-7</u>		
Document is:	<input checked="" type="checkbox"/> Final <input type="checkbox"/> Draft	
Additional Instructions: <u>Go final - format if needed</u>		

Chain of Review		
Reviewer:	Initials	Date:
Project Manager: <u>BSP</u>	<u>BSP</u>	<u>3-9-07</u>
Client: _____	_____	_____
Professional Stamp: _____	_____	_____

Administrative	PM's QA/QC								
Check once completed: Format check for client review <input checked="" type="checkbox"/> <u>NA</u> Finalize (final format check, print on letterhead, print color figures, fresh tables, etc.) <input checked="" type="checkbox"/> Final QA/QC <input checked="" type="checkbox"/> Distribute Report <input checked="" type="checkbox"/> Date Sent: <u>3/9/07</u>	<table border="1" style="width: 100%;"> <tr> <th>Report appearance (text/formatting)</th> <th>Figures</th> </tr> <tr> <td>Okay <input type="checkbox"/> See Comments _____</td> <td>Okay <input checked="" type="checkbox"/> See Comments _____</td> </tr> <tr> <th>Tables</th> <th>Attachments</th> </tr> <tr> <td>Okay <input type="checkbox"/> See Comments _____</td> <td>Okay <input type="checkbox"/> See Comments _____</td> </tr> </table>	Report appearance (text/formatting)	Figures	Okay <input type="checkbox"/> See Comments _____	Okay <input checked="" type="checkbox"/> See Comments _____	Tables	Attachments	Okay <input type="checkbox"/> See Comments _____	Okay <input type="checkbox"/> See Comments _____
Report appearance (text/formatting)	Figures								
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Original: <u>DER</u>	<u>1</u>			<u>X</u>	<u>X</u>							<u>X</u>
Copies: <u>Mike Noll</u>	<u>1</u>				<u>X</u>							
<u>Darin Rausch</u>	<u>1</u>				<u>2</u>			<u>2nd</u>				
<u>Robert Trudinger</u>	<u>1</u>				<u>2</u>			<u>2nd</u>				
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Administrative File	<u>(1)</u>											
Total No. of Copies	<u>7</u>											

March 9, 2007

Mr. Michael Romero  
Oregon Department of Environmental Quality  
2020 SW 4th Avenue, Suite 400  
Portland, OR 97201

**FILE COPY**

UPLOADED INTO WEBEX

DATE: 3/9/07

BY: *CCR*

**RE: 2007 Project Schedule  
Willbridge Terminals Group  
Portland, Oregon  
Consent Order WMCSR-NWR-94-06**

Dear Mr. Romero:



Delta Environmental Consultants, Inc. (Delta), on behalf of the Willbridge Terminals Group (WTG), consisting of Kinder Morgan Liquids Terminals, LLC., ConocoPhillips Company, and ChevronTexaco Company, has prepared this letter to present the project schedule for 2007 and provide information requested by you and Mr. Henning Larson during our January 23, 2007 meeting.

During the meeting the DEQ requested a list of key documents prepared since the Final RI dated August 1, 2003. The key documents are listed below.

- *Revised Source Control Evaluation* December 7, 2004
- *Remedial Investigation Addendum Report* June 30, 2005
- *Feasibility Study Scoping Document* September 20, 2005
- *2006 Groundwater Monitoring Sampling and Analysis Plan Addendum* September 22, 2006
- *Storm Water Pathway Evaluation Work Plan* Prepared for ConocoPhillips Terminal dated October 20, 2006
- *Storm Water Evaluation Work Plan* Prepared for Chevron Willbridge Distribution Center No. 100-1868 (BBL 2006).
- *Interim remedial Action Measures* Prepared for Chevron Willbridge Distribution Center No. 100-1868 (ARCADIS BBL 2006)

In a letter dated October 19, 2001, the DEQ approved semi-annual groundwater monitoring with quarterly gauging and monthly SPH removal, with reports submitted semi-annually starting in September 2001. Accordingly, the reports were to be submitted by the 15th of the second month following the two reporting periods. During the January 23, 2007 meeting, it was agreed that quarterly status reports would also be submitted to the DEQ going forward in 2007.

During the meeting on January 23, 2007, the DEQ approval letters *DEQ Comments/Conditional Approval of Revised Source Control Evaluation* dated June 15, 2006 and *DEQ Comments/Conditional Approval of Remedial Investigation Report Addendum and Feasibility Scoping Document* dated June 21, 2006 were reviewed and discussed. At the end of the discussion, the DEQ requested a project schedule to address the comments in the letters and to complete the FS. Our proposed schedule of work plans and documents is presented below.

- Stormwater Pathway Evaluation work plan for Kinder Morgan: Submitted by **March 15, 2007**.
- Draft Sheet Pile Cut-Off/Recovery System Wall Performance Monitoring Program Work Plan: Submittal date **March 30, 2007**
- Status report of seep sampling beyond the sheet-pile cut-off walls: Submitted by **April 13, 2007**.
- Draft Riverbank Soil Erosion Pathway Evaluation: Submittal date **April 16, 2007**.
- Draft Columbia River Basalt Aquifer Characterization Work Plan: Submittal date **April 20, 2007**.

And as requested by the DEQ, the following items will be addressed in the Feasibility Study (FS).

- Groundwater discharges and contaminant flux to the Willamette River
- Hot spot determination update
- Potential impacts to Saltzman Creek, and beach area at the mouth of the river
- Future risks to Certain Teed workers from impacted groundwater.

Field work schedules will be provided in the work plans. The FS schedule will be provided once the field work has been completed in the proposed work plans above. If field work is conducted by June 2007 the Draft FS would be submitted to the DEQ during the First Quarter of 2008.

The WTG appreciates your efforts to meet with the group and look forward to working with you on this project. If you have any questions regarding the contents of this letter, please call me at (503) 639-8098.

Sincerely,  
**Delta Environmental Consultants, Inc.**



Brian J. Pletcher, R.G.  
Senior Project Geologist

cc: Mike Noll, ConocoPhillips  
Darin Rouse, Chevron Environmental Management Company  
Robert Truedinger, KMEP  
Grant V. Sprick, ARCADIS BBL  
Gerard Koschal, Red Hills Environmental



---

MEMORANDUM

---

TO: TAKU FUJI, PHD. - HARTCROWSER  
FROM: KELLY A. KLINE - KHM ENVIRONMENTAL  
SUBJECT: WILLBRIDGE TERMINAL DATA REVIEW MEMORANDUM FROM NEIL MORTEN  
DATE: MARCH 25, 2003  
CC: SCOTT MILLER, KHM ENVIRONMENTAL MANAGEMENT, INC.

---

I have prepared this memo to answer the questions Neil had in his memo regarding the Willbridge data submittal. I have answered the questions in the order they were presented in his memo dated November 2002.

KINDER MORGAN PROPERTY

Groundwater

- KHM has corrected Figure 9 (See Attached figure).
- The sample date for Sample MW-33 on Table 7 was incorrect. The date has been corrected to 10/31/97. The sample date for Sample MW-33-D of 11/4/97 is correct.
- The sample date of 12/9/98 in the analytical table for Sample MW-13 is correct for VOCs analysis. The date for the BTEX analysis for this sample location is 10/27/97. Figure 9 was corrected.
- The sample date of 12/8/98 for the VOCs analysis for Well MW-30 is correct in Table 9. The date for the BTEX analysis for this sample location is 10/27/97. Figure 9 was corrected.
- Table 6 has been corrected to include PAH data for Sample MW-32.
- For sample location MW-33, PAHs were ND on 10/31/97 and not analyzed on 12/11/98. For this same sample location, SVOCs were not analyzed on 10/31/97 and non-detect on 12/11/98. This is shown on Figure 12. Note: SVOCs and PAHs analyses were requested on the chain of custody. Due to laboratory error the samples were only analyzed for SVOCs. The separate PAH analysis was not run.
- Table 6 was corrected to show the correct sample date for Samples MW-13 and MW-13D. The correct date is 10/27/97. In addition, the sample dates on Table 6 for Samples MW-33 and MW-33D were corrected. The correct sample dates are 10/31/97 and 11/4/97, respectively.

#### Surface Soil

- Table 32A has been corrected. The "U" designation was inadvertently left off several of the analytical results. The "U" designation stands for non detect. The detected concentrations are now bolded and the concentrations have been added to Figure 26.

#### Subsurface Soil

- Table 29b was corrected to reflect C-RF-1(16) and C-RF-3(12) as samples from the Chevron portion of the site.
- VOCs concentrations for Sample G-HP-13(8) are ND and are reflected in both Table 30b and Figure 35.
- BTEX, PAHs, SVOCs, and aviation gas hotspot results from samples collected from depths of 2 to 2.5 feet are now included on Figure 29.
- This has been corrected. The analytical tables and figures now correspond.

#### CONOCOPHILLIPS PROPERTY

##### Groundwater

- Both results should be included in the risk assessment. The lab notes state "Two sets of data are reported. The second set of results are significantly lower than the initial run. Inspection of samples indicates correct dilutions were used in calculations. Inspection of samples indicates that vial C contains higher levels of volatiles than vial D. Client Ids are the same for both vials."
- Figure 13 has been corrected to show the detection of phenanthrene.

##### Surface Soil

- The results for T-SS-14 should be included in the risk assessment. Sample T-SS-14(RR) is a rerun by the laboratory that confirmed the initial results which are ND for all compounds. Figure 23 has been corrected to show both results.

##### Subsurface Soil

- The results for Sample T-RF-2(8) were deleted off of Figure 30.
- The results for Samples T-HS-4(12) and T-HS-(17) have been removed from Table 27b.

Please call me at 503-639-8098 with any questions concerning this project.



# LEGEND

- MW-1 ● MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- GATX-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- GATX-HP-1 ⊕ PUSH-PROBE LOCATION
- ▨ SURROGATE STUDY AREA FOR "HOT SPOTS"
- FORMER UST LOCATIONS
- GATX-HS-1 ◆ SURROGATE HOT SPOT PROBE LOCATION

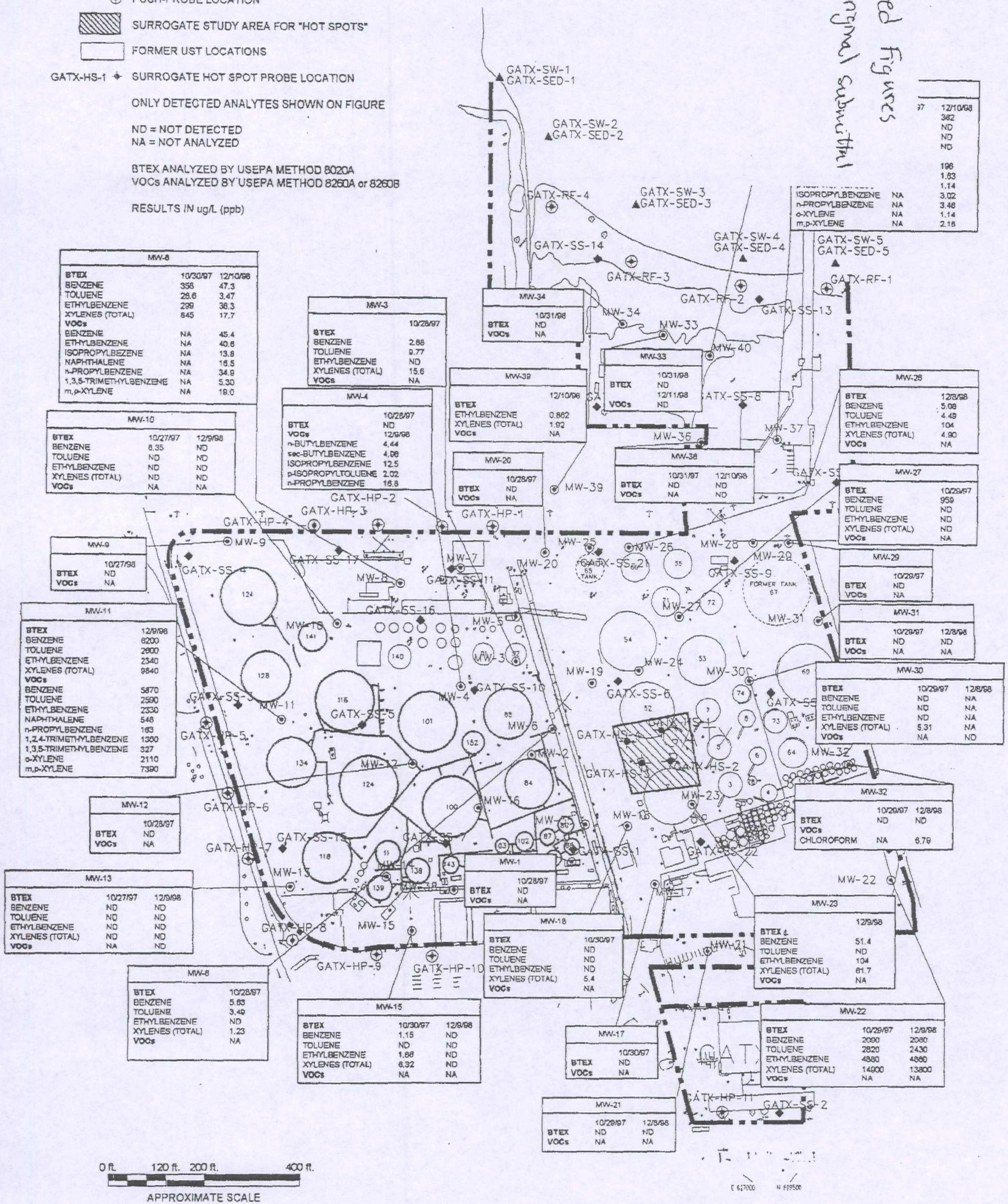
ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
VOCs ANALYZED BY USEPA METHOD 8260A or 8260B

RESULTS IN ug/L (ppb)



Corrected figures  
from original submittal



<b>KHM</b> ENVIRONMENTAL MANAGEMENT INC.	TITLE <b>Groundwater Analytical Results - BTEX and VOCs</b> <b>October 1997 and December 1998</b>		
	<b>Willbridge Facility - Kinder Morgan (formerly GATX)</b> Remedial Investigation Portland, Oregon		
	DATE <b>July 2002</b>	PROJECT <b>B17-01G</b>	FIGURE <b>9</b>



# LEGEND

- MW-1 ● MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- GATX-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- GATX-HP-1 ⊕ PUSH-PROBE LOCATION
-  SURROGATE STUDY AREA FOR "HOT SPOTS"
-  FORMER UST LOCATIONS
- GATX-HS-1 ◆ SURROGATE HOT SPOT PROBE LOCATION

ONLY DETECTED ANALYTES SHOWN ON FIGURE

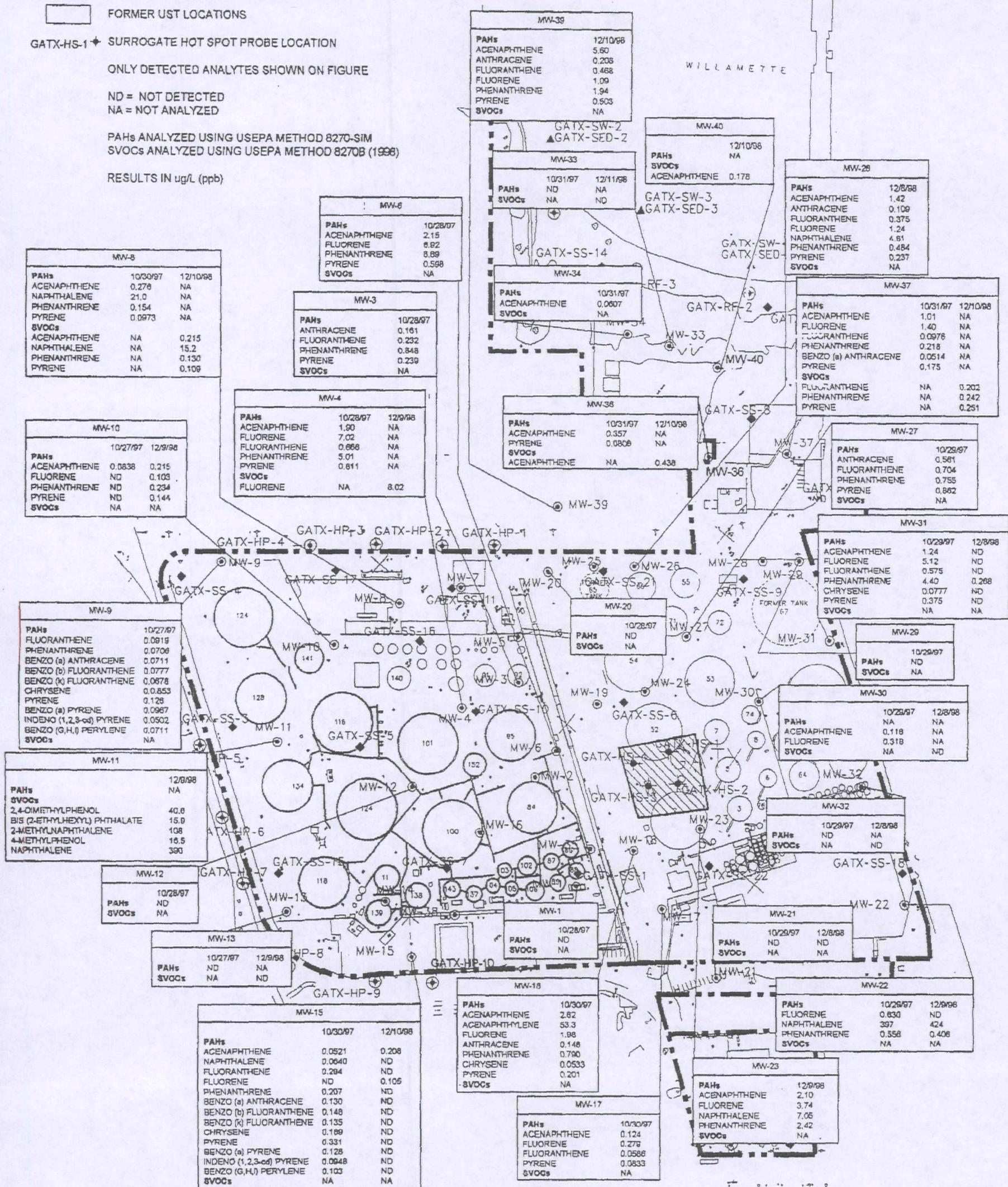
ND = NOT DETECTED

NA = NOT ANALYZED

PAHs ANALYZED USING USEPA METHOD 8270-SIM

SVOCs ANALYZED USING USEPA METHOD 8270B (1998)

RESULTS IN ug/L (ppb)



0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

<div> <div>KHM</div> <div>ENVIRONMENTAL MANAGEMENT INC.</div> </div>	TITLE		
	Groundwater Analytical Results - PAHs and SVOCs October 1997 and December 1998		
	Willbridge Facility - Kinder Morgan (formerly GATX) Remedial Investigation Portland, Oregon		
DATE	July 2002	PROJECT	B17-01G
		FIGURE	12







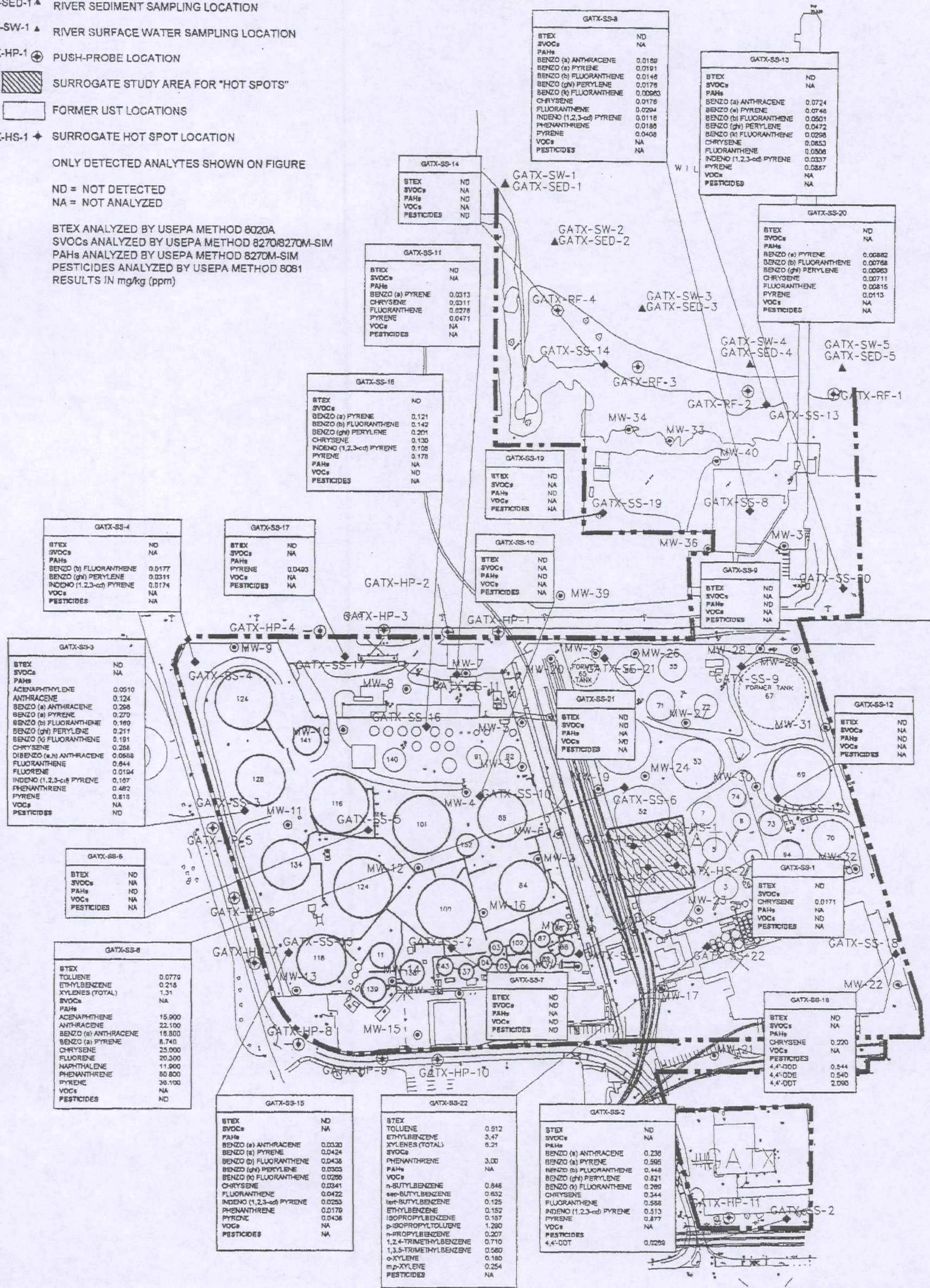
# LEGEND

- MW-1 ● MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- GATX-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- GATX-HP-1 ⊕ PUSH-PROBE LOCATION
- ▨ SURROGATE STUDY AREA FOR "HOT SPOTS"
- FORMER UST LOCATIONS
- GATX-HS-1 ◆ SURROGATE HOT SPOT LOCATION

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
PESTICIDES ANALYZED BY USEPA METHOD 8081  
RESULTS IN mg/kg (ppm)



0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

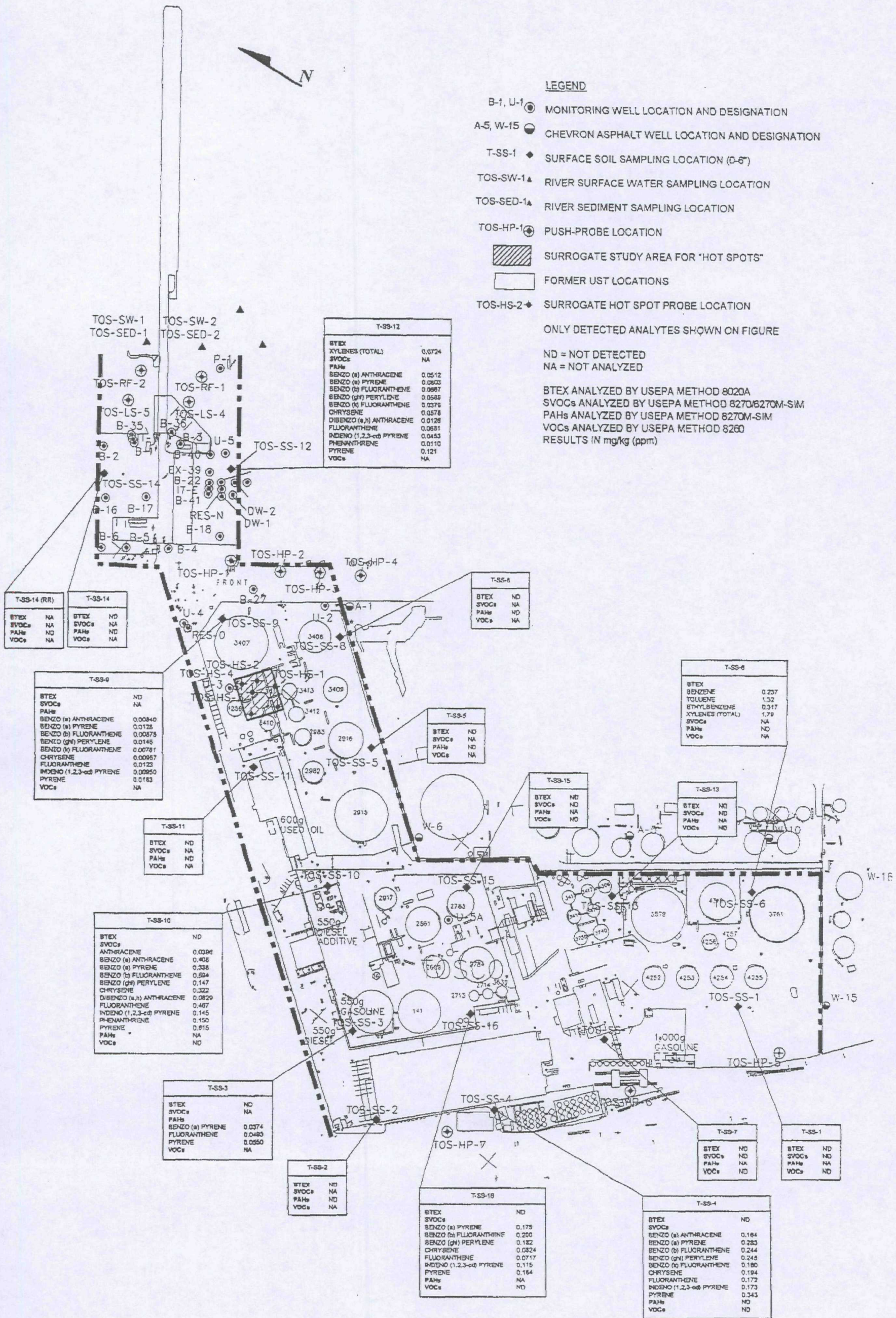
**KHM**  
ENVIRONMENTAL  
MANAGEMENT  
INC.

Surface Soil Analytical Results - BTEX, SVOCs, PAHs, VOCs & Pesticides - October - November 1998

Willbridge Facility - Kinder Morgan (formerly GATX)  
Remedial Investigation  
Portland, Oregon

DATE July 2002 PROJECT B17-01G FIGURE 26







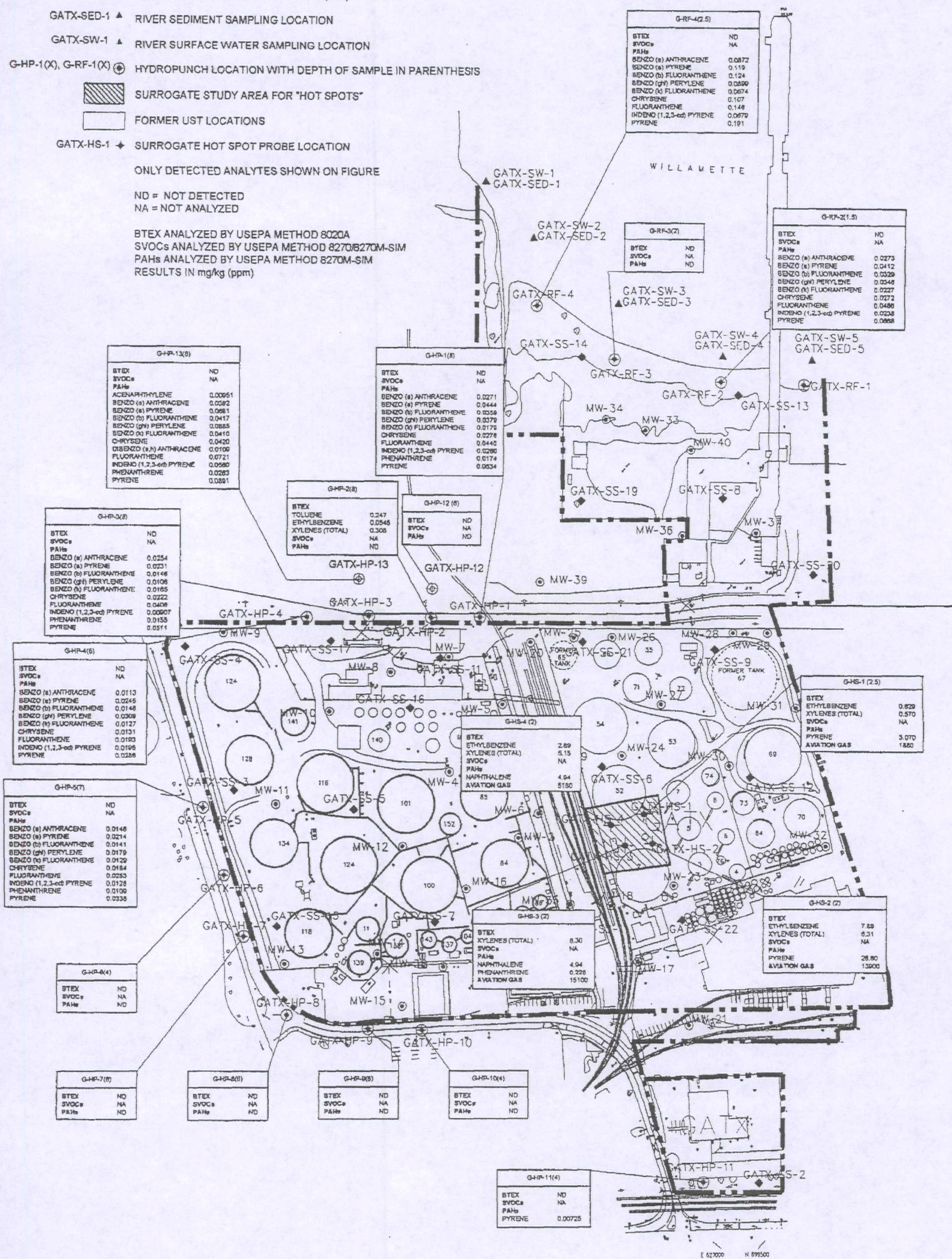
# LEGEND

- MW-1 ● MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- GATX-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- G-HP-1(X), G-RF-1(X) ⊕ HYDROPUNCH LOCATION WITH DEPTH OF SAMPLE IN PARENTHESES
- ▨ SURROGATE STUDY AREA FOR "HOT SPOTS"
- FORMER UST LOCATIONS
- GATX-HS-1 ◆ SURROGATE HOT SPOT PROBE LOCATION

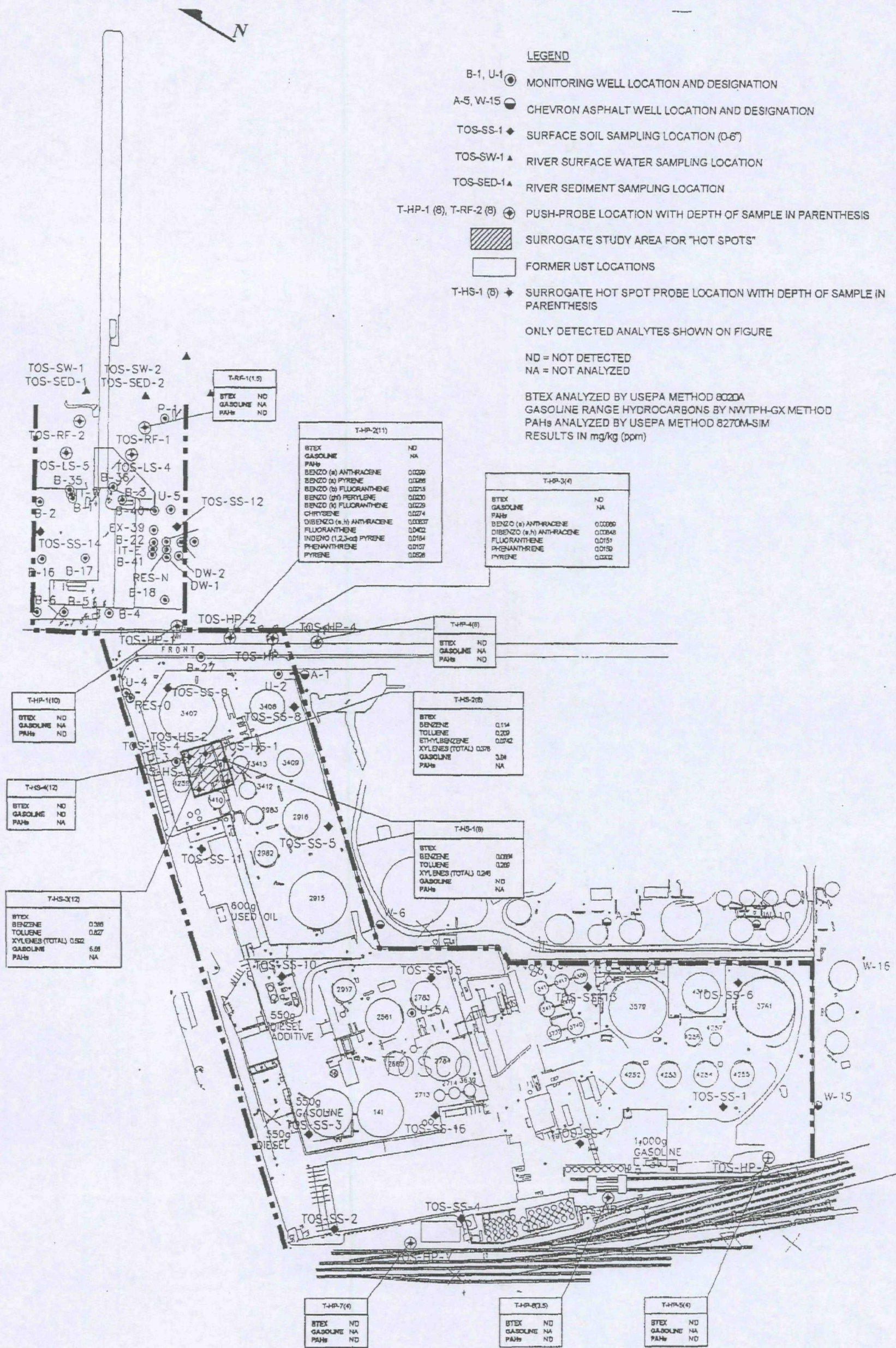
ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
RESULTS IN mg/kg (ppm)







<b>KHM</b> ENVIRONMENTAL MANAGEMENT INC.	Vadose Zone Soil Analytical Results - BTEX, Gasoline Range Hydrocarbons, and PAHs - October - November 1998		
	Willbridge Facility - TOSCO Remedial Investigation Portland, Oregon		
	DATE July 2002	PROJECT B17-01G	FIGURE 30



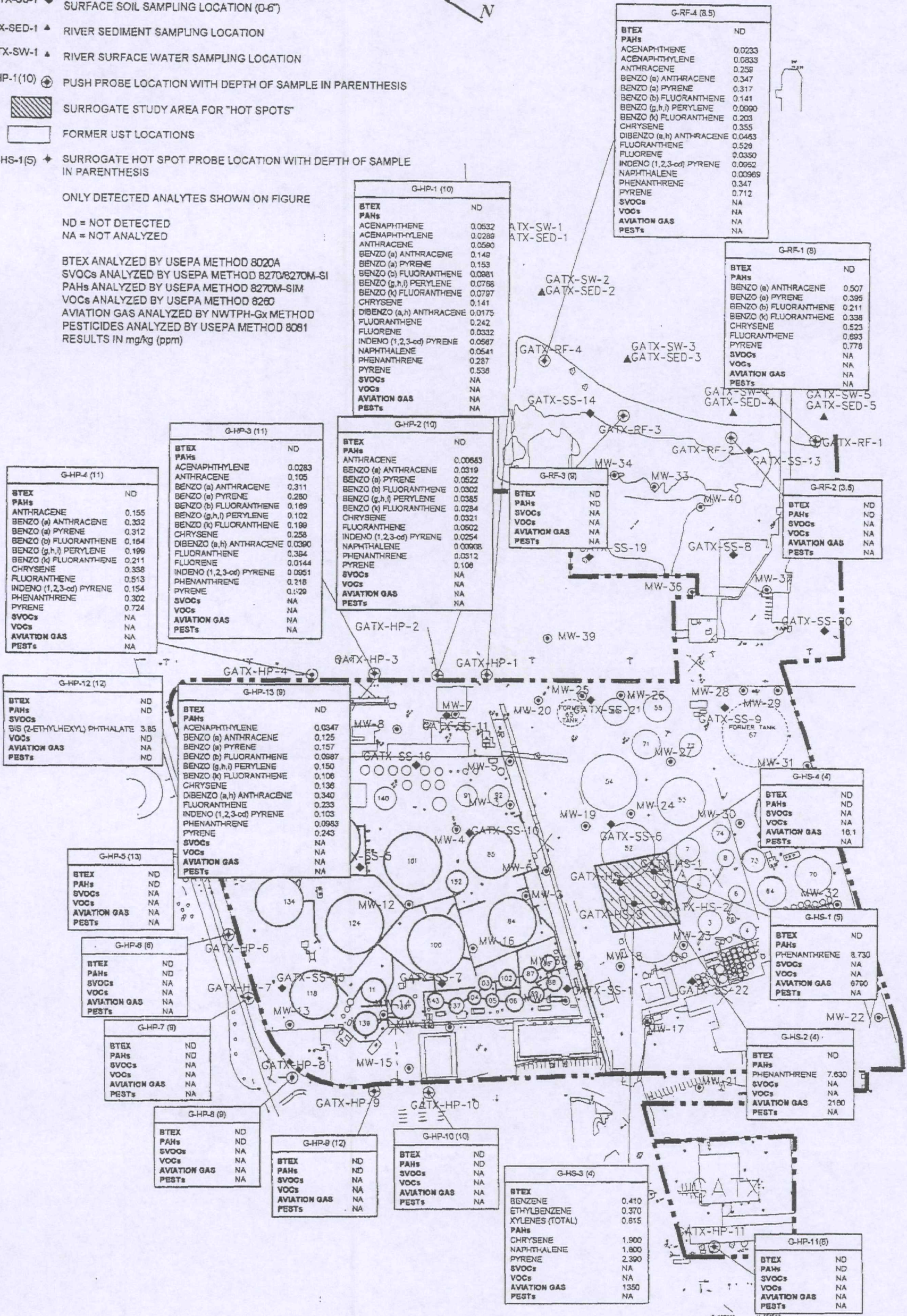
# LEGEND

- MW-1 (10) MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 (6-6) SURFACE SOIL SAMPLING LOCATION (D-6")
- GATX-SED-1 RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 RIVER SURFACE WATER SAMPLING LOCATION
- G-HP-1(10) PUSH PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS
- SURROGATE STUDY AREA FOR "HOT SPOTS"
- FORMER UST LOCATIONS
- G-HS-1(5) SURROGATE HOT SPOT PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SI  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
VOCs ANALYZED BY USEPA METHOD 8260  
AVIATION GAS ANALYZED BY NWTPH-Gx METHOD  
PESTICIDES ANALYZED BY USEPA METHOD 8081  
RESULTS IN mg/kg (ppm)





# LEGEND

- MW-1 MONITORING WELL LOCATION AND DESIGNATION
- GATX-SS-1 SURFACE SOIL SAMPLING LOCATION (0-6")
- GATX-SED-1 RIVER SEDIMENT SAMPLING LOCATION
- GATX-SW-1 RIVER SURFACE WATER SAMPLING LOCATION
- G-HP-1(X), G-RF-1(X) PUSH-PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS



SURROGATE STUDY AREA FOR "HOT SPOTS"



FORMER UST LOCATIONS

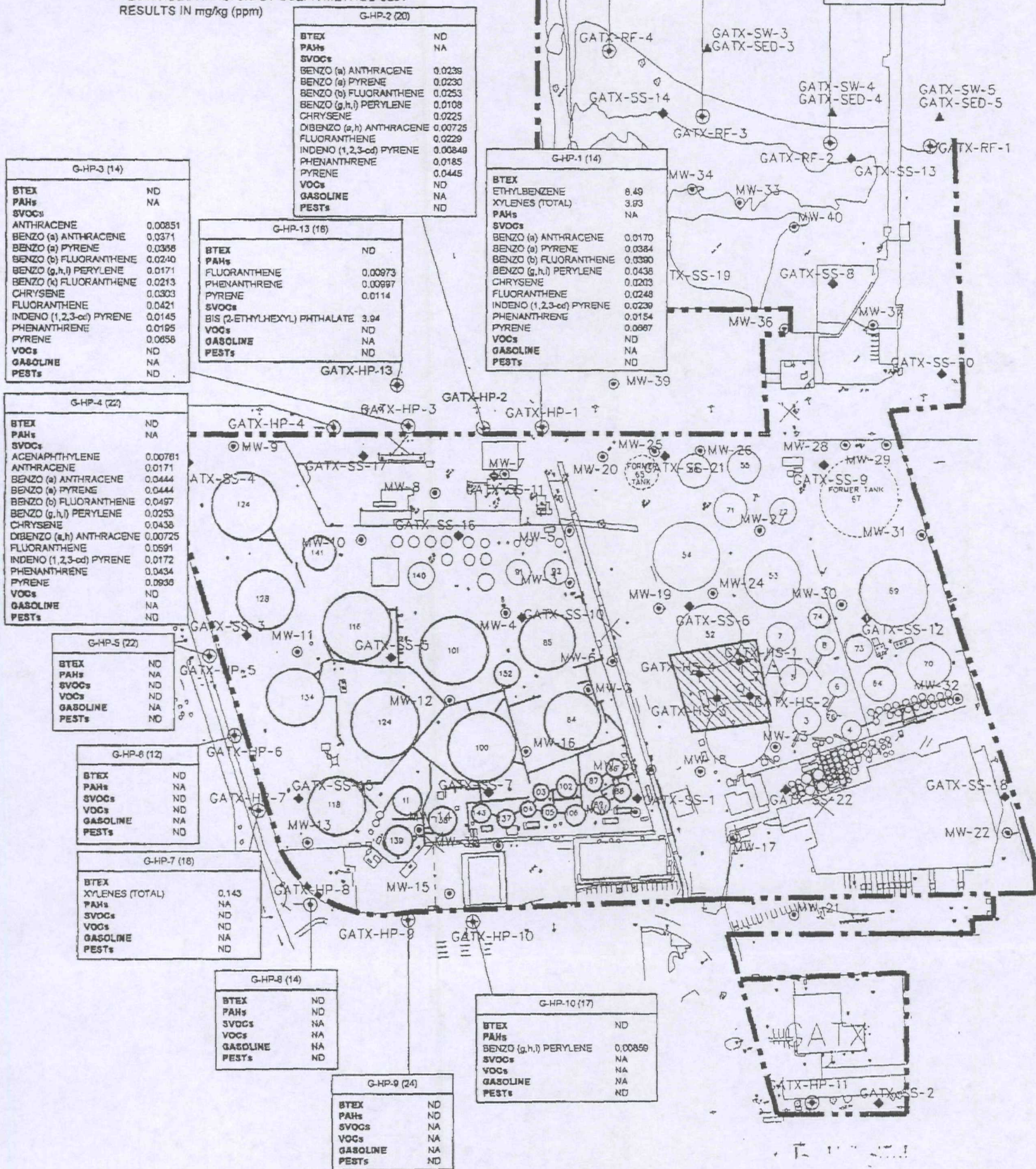
- GATX-HS-1 SURROGATE HOT SPOT PROBE LOCATION

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED

NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
 SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
 PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
 VOCs ANALYZED BY USEPA METHOD 8260  
 PESTICIDES ANALYSIS BY USEPA METHOD 8061  
 RESULTS IN mg/kg (ppm)



0 ft. 120 ft. 200 ft. 400 ft.  
 APPROXIMATE SCALE

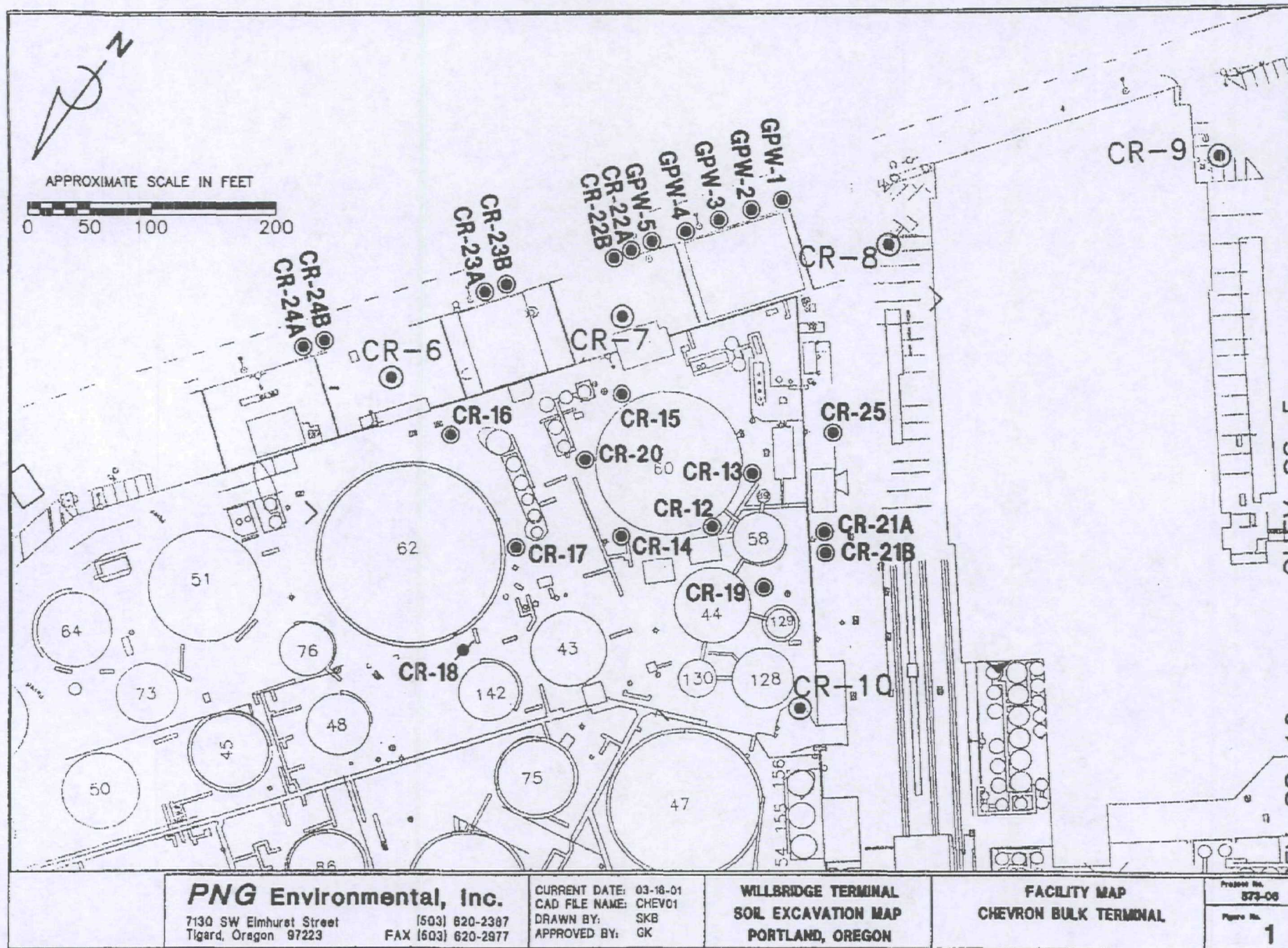
**KHM**  
 ENVIRONMENTAL  
 MANAGEMENT INC.

Saturated Zone Soil Analytical Results - BTEX, PAHs, SVOCs, VOCs, Gasoline  
 Range Hydrocarbons & Pesticides - October and November 1998

**Willbridge Facility - Kinder Morgan (formerly GATX)**  
 Remedial Investigation  
 Portland, Oregon

DATE	July 2002	PROJECT	B17-01G	FIGURE	35
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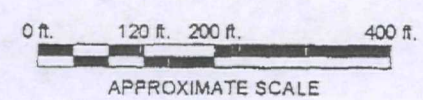
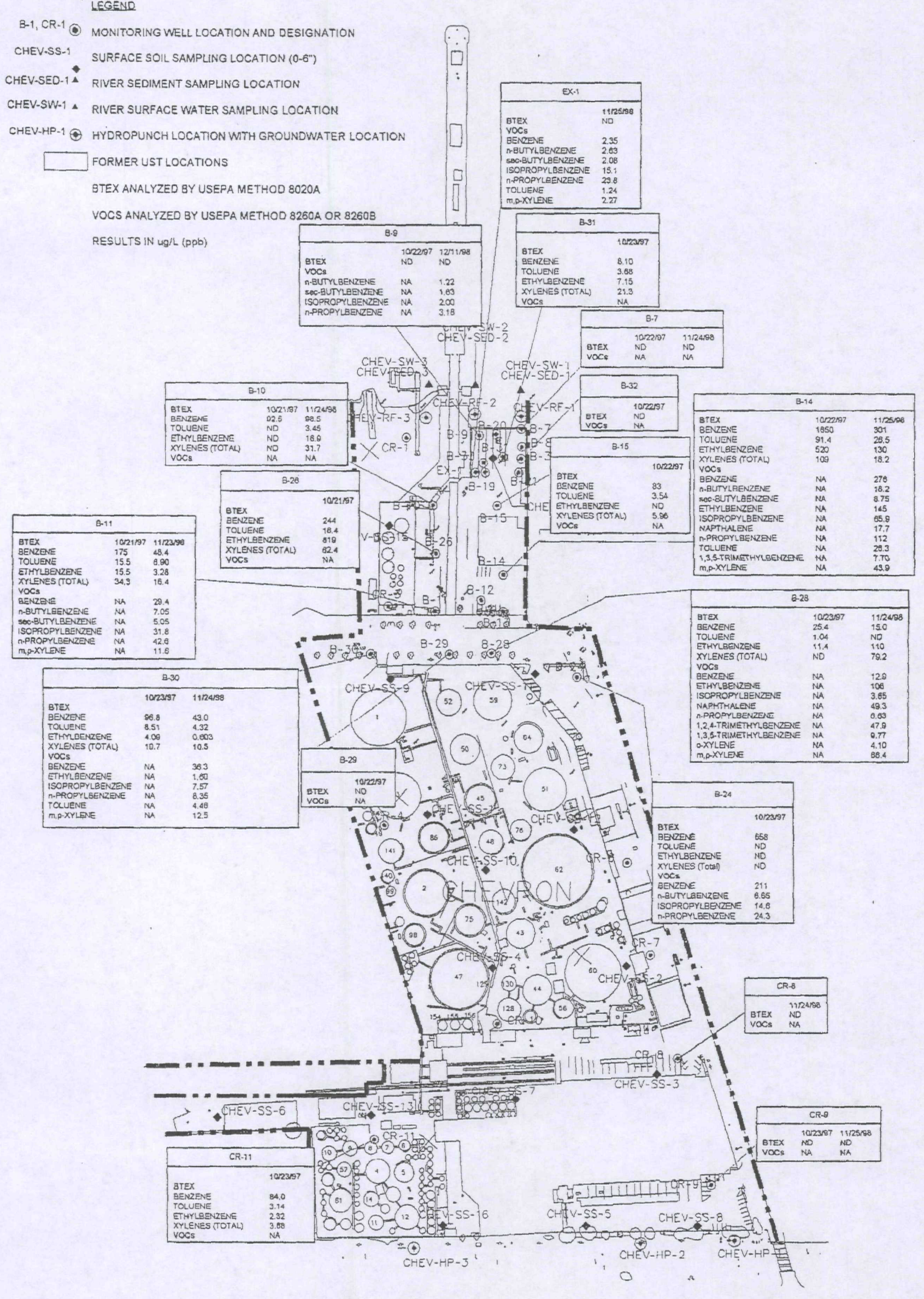
**LEGEND**

- B-1, CR-1 MONITORING WELL LOCATION AND DESIGNATION
- CHEV-SS-1 SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 RIVER SURFACE WATER SAMPLING LOCATION
- CHEV-HP-1 HYDROPUNCH LOCATION WITH GROUNDWATER LOCATION
- FORMER UST LOCATIONS

BTEX ANALYZED BY USEPA METHOD 8020A

VOCs ANALYZED BY USEPA METHOD 8260A OR 8260B

RESULTS IN ug/L (ppb)



**KHM**  
ENVIRONMENTAL  
MANAGEMENT  
INC.

**TITLE** Groundwater Analytical Results - BTEX and VOCs  
October 1997 and November, December 1998

**Willbridge Facility - Chevron**  
Remedial Investigation  
Portland, Oregon

DATE	PROJECT	FIGURE
July 2002	B17-01G	8



# LEGEND

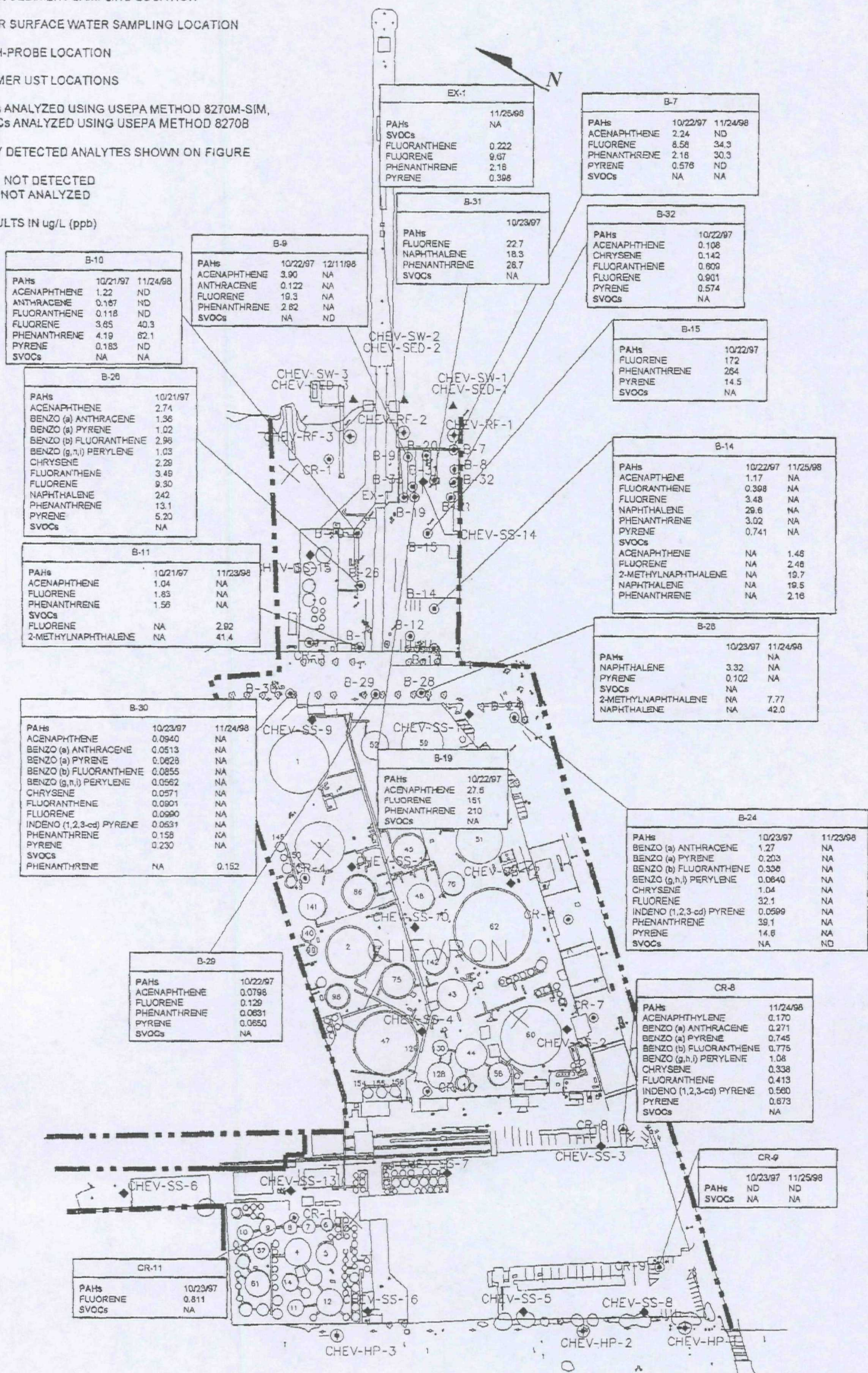
- B-1, CR-1, EX-1 MONITORING WELL LOCATION AND DESIGNATION
- CHEV-SS-1 SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 RIVER SURFACE WATER SAMPLING LOCATION
- CHEV-HP-1 PUSH-PROBE LOCATION
- FORMER UST LOCATIONS

PAHs ANALYZED USING USEPA METHOD 8270M-SIM,  
SVOCs ANALYZED USING USEPA METHOD 8270B

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

RESULTS IN ug/L (ppb)



0 120 200 400  
APPROXIMATE SCALE

KHM ENVIRONMENTAL MANAGEMENT INC.	TITLE Groundwater Analytical Results - PAHs and SVOCs October 1997 and November, December 1998		
	Willbridge Facility - Chevron Remedial Investigation Portland, Oregon		
DATE	July 2002	PROJECT	B17-01G
FIGURE	11		




B-1, CR-1, EX-1 (C) MONITORING WELL LOCATION AND DESIGNATION

CHEV-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")

CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION

CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION

CHEV-HP-1  PUSH-PROBE LOCATION

☐ FORMER UST LOCATIONS

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED

NA = NOT ANALYZED

METALS ANALYZED USING USEPA METHOD 6000/7000 SERIES

RESULTS IN  $\text{mg} \Delta$  (nm)

B-0		
TOTAL METALS	10/22/97	12/11/98
ARSENIC	0.0284	0.00540
BARIUM	0.219	0.2598
CADMIUM	0.000300	ND
CHROMIUM	0.0289	0.00510
COPPER	NA	0.0119
LEAD	0.0135	0.0038
MERCURY	0.00103	0.000310
SELENIUM	0.00100	ND
SILVER	0.00260	ND
ZINC	NA	0.0255
DISSOLVED METALS		
ARSENIC	0.0195	0.00160
BARIUM	0.0846	0.0232
COPPER	NA	ND
ZINC	NA	0.0190

	B-T	
TOTAL METALS	10/22/97	11/24/98
ARSENIC	0.0281	0.0250
BARIUM	0.0774	0.172
CADMIUM	0.000200	ND
CHROMIUM	0.00150	0.0155
COPPER	NA	0.0285
LEAD	0.00103	0.00560
MERCURY	0.000390	0.00077
0		
SILVER	0.00280	ND
ZINC	NA	0.0060
DISSOLVED METALS	NA	NA

B-32	
TOTAL METALS	10/22/97
ARSENIC	0.000500
BARIUM	0.119
CHROMIUM	0.00660
COPPER	NA
LEAD	0.00350
MERCURY	0.00103
ZINC	NA
DISSOLVED METALS	NA

B-15	
TOTAL METALS	10/22/97
ARSENIC	0.0474
BARIUM	0.882
CADMIUM	0.0143
CHROMIUM	0.100
COPPER	NA
LEAD	0.0637
SELENIUM	0.00200
SILVER	0.00200
ZINC	NA
DISSOLVED METALS	NA

B-18	
TOTAL METALS	10/22/97
ARSENIC	0.0674
BARIUM	1.33
CADMIUM	0.00161
CHROMIUM	0.217
COPPER	NA
LEAD	0.0671
SELENIUM	0.60170
SILVER	0.06338
ZINC	NA
DISSOLVED METALS	NA

EX-1	
TOTAL METALS	11/23/98
ARSENIC	0.0226
BARIUM	0.0508
COPPER	0.00226
LEAD	0.00190
MERCURY	0.000380
ZINC	0.00950
DISSOLVED METALS	
ARSENIC	0.0193
BARIUM	0.0373
MERCURY	0.000410
ZINC	0.00630

B-10		
TOTAL METALS	10/21/97	11/24/98
ARSENIC	0.0314	0.0335
BARIUM	0.0083	0.294
CHROMIUM	0.00273	0.0370
COPPER	NA	0.0015
LEAD	0.00145	0.0165
ZINC	NA	0.101
DISSOLVED METALS	NA	NA

B-20	
TOTAL METALS	10/21/97
ARSENIC	0.05510
BARIUM	0.033
CADMIUM	0.0349
CHROMIUM	0.0982
COPPER	NA
LEAD	0.132
MERCURY	0.000540
SELENIUM	0.00198
SILVER	0.00148
ZINC	NA
DISSOLVED METALS	NA

B-14		
TOTAL METALS	10/22/97	11/25/98
ARGENIC	0.0389	0.0314
BARIUM	0.153	0.117
CADMIUM	0.000100	ND
CHROMIUM	0.0135	0.0080
COPPER	NA	0.0154
LEAD	0.0140	0.00720
MERCURY	0.000420	ND
ZINC	NA	0.0288
DISSOLVED METALS		
ARGENIC	0.0289	0.0307
BARIUM	0.0085	0.0652
CHROMIUM	0.00100	ND
COPPER	NA	ND
LEAD	ND	0.00110
MERCURY	ND	0.00023
ZINC	NA	0.0105

B-28		
TOTAL METALS	10/23/97	11/24/98
ARSENIC	0.00920	0.0150
BARIUM	0.205	0.880
CHROMIUM	0.0142	0.0175
COPPER	NA	0.242
LEAD	0.0781	0.0985
MERCURY	ND	0.00030
0		
SELENIUM	0.00120	ND
ZINC	NA	0.428
DISSOLVED METALS	NA	NA

B-30		
TOTAL METALS		
ARSENIC	10/23/97	11/24/98
BARIUM	0.0345	0.0138
CADMIUM	0.981	1.192
CHROMIUM	0.00670	0.00250
COPPER	0.128	0.0208
LEAD	NA	0.0306
MERCURY	0.0716	0.0148
0	ND	0.00022
SELENIUM	0.00230	ND
SILVER	0.00380	0.00120
ZINC	NA	0.0775
DISSOLVED METALS		
ARSENIC	0.0155	0.0135
BARIUM	0.0723	0.0586
COPPER	ND	ND
MERCURY	ND	0.00021
0		
ZINC	NA	0.0175

TOTAL METALS	10/22/97
ARSENIC	0.0108
BARIUM	0.981
CADMIUM	0.00720
CHROMIUM	0.0825
COPPER	NA
LEAD	0.0331
SELENIUM	0.00160
ZINC	NA
DISSOLVED METALS	NA

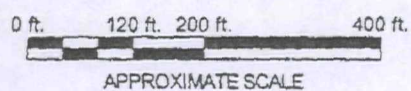
B-24	
TOTAL METALS	10/23/97
ARSENIC	0.00120
BARIUM	0.213
CHROMIUM	0.145
COPPER	NA
LEAD	0.00560
MERCURY	0.000400
ZINC	NA
DISSOLVED METALS	
ARSENIC	0.0375
BARIUM	0.0515
COPPER	NA
CHROMIUM	NA

B-11		
TOTAL METALS	10/21/97	11/23/98
ARSENIC	0.0358	0.0325
BARIUM	0.303	0.250
CADMIUM	0.000400	ND
CHROMIUM	0.0389	0.0345
COPPER	NA	0.0503
LEAD	0.0229	0.0195
MERCURY	ND	0.000250
SELENIUM	0.00102	ND
ZINC		0.100
DISSOLVED METALS	NA	NA

CR-9		
TOTAL METALS	10/23/97	11/25/98
ARSENIC	0.00180	ND
BARIUM	0.0311	0.0170
COPPER	NA	ND
LEAD	0.00280	ND
ZINC	NA	0.00790
DISSOLVED METALS		
BARIUM	NA	0.0150
ZINC	NA	0.00810

CR-11	
TOTAL METALS	10/23/97
ARSENIC	0.0558
BARIUM	0.207
CADMIUM	0.00140
CHROMIUM	0.00890
COPPER	NA
LEAD	0.00870
SELENIUM	0.00210
ZINC	NA
DISSOLVED METALS	NA

CR-8	
TOTAL METALS	11/24/98
ARSENIC	0.0313
BARIUM	0.0837
CADMIUM	0.00130
CHROMIUM	0.00520
COPPER	0.0166
LEAD	0.00800
MERCURY	0.000290
ZINC	0.0320
DISSOLVED METALS	NA



# KHM

ENVIRONMENTAL  
MANAGEMENT INC.

TITLE	Groundwater Analytical Results - Total and Dissolved Metals October 1997 and November 1998
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**Willbridge Facility - Chevron**  
Remedial Investigation  
Portland, Oregon

DATE	July 2002	PROJECT	B17-01G	FIGURE	17
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# LEGEND

- B-1, CR-1 ● MONITORING WELL LOCATION AND DESIGNATION
- CHEV-SS-1 ▲ SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- C-HP-1, C-RF-1 ⊕ PUSH-PROBE LOCATION
- FORMER UST LOCATIONS

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
VOCs ANALYZED BY USEPA METHOD 8260  
PESTs ANALYZED BY USEPA METHOD 8081  
RESULTS IN ug/L (ppb)

C-LS-4	
BTEX	10/30/98
TOLUENE	0.819
PAHs	
FLUORENE	3.89
SVOCs	NA
VOCs	NA
PESTs	NA

C-LS-3	
BTEX	10/30/98
BENZENE	12.7
TOLUENE	11.0
ETHYLBENZENE	8.08
XYLENES (TOTAL)	28.7
PAHs	
FLUORENE	3.85
PHENANTHRENE	2.59
SVOCs	NA
VOCs	NA
PESTs	NA

C-RF-2	
BTEX	10/15/98
ETHYLBENZENE	0.659
XYLENES (TOTAL)	1.17
PAHs	NA
SVOCs	
BIS (2-ETHYLHEXYL) PHTHALATE	70.8
VOCs	
sec-BUTYLBENZENE	5.75
PESTs	NO

C-RF-3	
BTEX	10/15/98
PAHs	ND
SVOCs	
BIS (2-ETHYLHEXYL) PHTHALATE	3530
FLUORENE	2040
PHENANTHRENE	2400
VOCs	ND
PESTs	ND

C-RF-1	
BTEX	10/15/98
BENZENE	0.575
TOLUENE	1.55
ETHYLBENZENE	8.03
XYLENES (TOTAL)	27.0
PAHs	NA
SVOCs	
FLUORENE	99.8
PYRENE	3.51
VOCs	
n-BUTYLBENZENE	3.08
sec-BUTYLBENZENE	2.77
n-PROPYLBENZENE	7.78
ISOPROPYLBENZENE	5.42
PESTs	NA

C-HP-3	
BTEX	10/15/98
PAHs	ND
ACENAPHTHENE	0.290
BENZO (a) ANTHRACENE	0.354
BENZO (a) PYRENE	0.288
BENZO (b) FLUORANTHENE	0.328
BENZO (g,h,i) PERYLENE	0.228
BENZO (k) FLUORANTHENE	0.212
CHRYSENE	0.464
FLUORANTHENE	0.824
PHENANTHRENE	1.27
PYRENE	1.44
SVOCs	NA
VOCs	NA
PESTs	NA

C-HP-2	
BTEX	10/15/98
PAHs	ND
ACENAPHTHENE	0.329
FLUORANTHENE	0.437
PHENANTHRENE	0.808
PYRENE	0.442
SVOCs	NA
VOCs	NA
PESTs	NA

C-HP-1	
BTEX	10/15/98
PAHs	ND
SVOCs	NA
VOCs	NA
PESTs	NA

0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

**KHM**  
ENVIRONMENTAL  
MANAGEMENT  
INC.

Hydropunch Groundwater Analytical Results - BTEX, PAHs, SVOCs, VOCs, and Pesticides - October - November 1998

Willbridge Facility - Chevron  
Remedial Investigation  
Portland, Oregon

DATE July 2002 PROJECT B17-01G FIGURE 21



# LEGEND

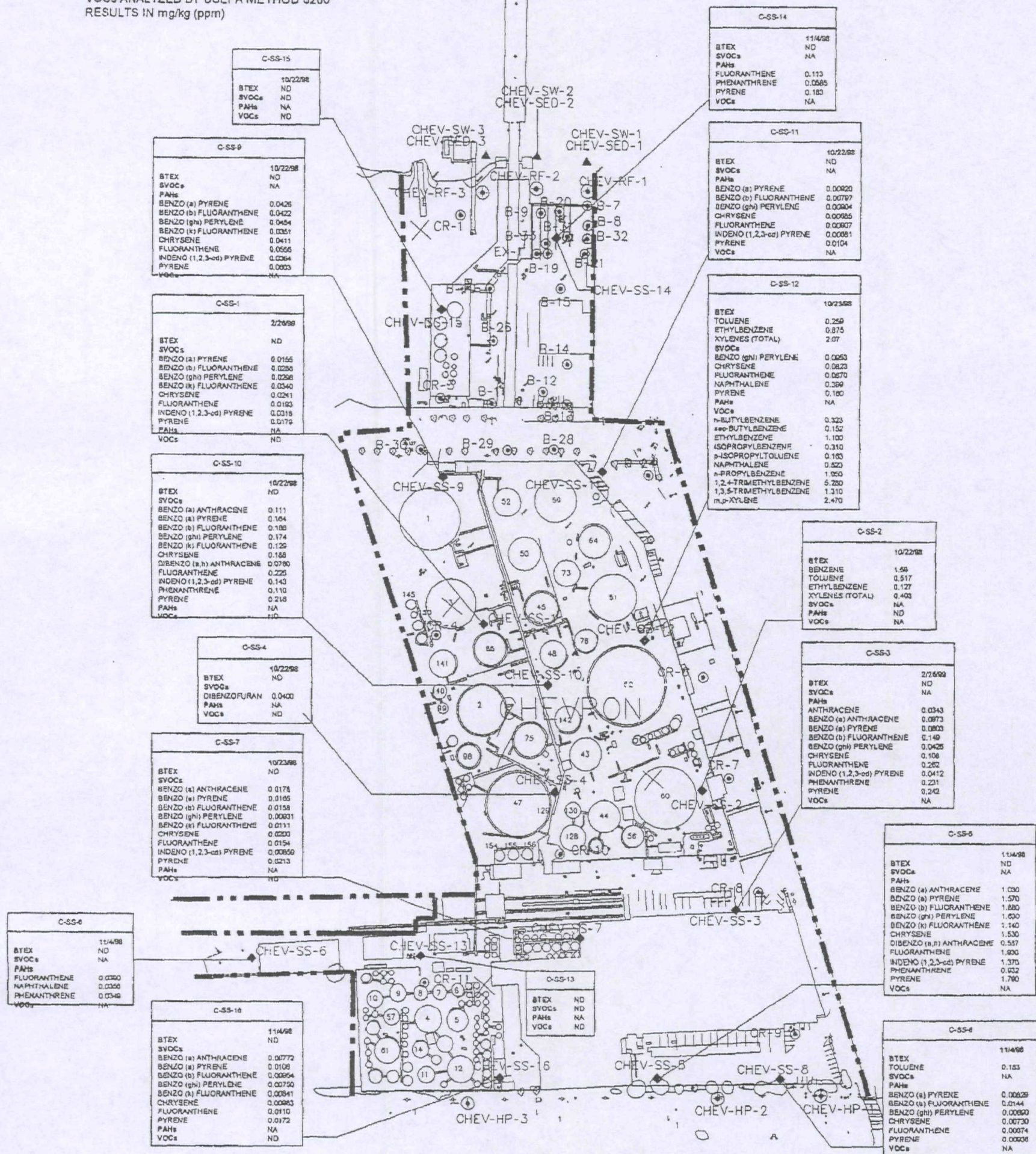
- B-1, CR-1 ● MONITORING WELL LOCATION AND DESIGNATION
- C-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- CHEV-HP-1 ⊕ PUSH-PROBE LOCATION

FORMER UST LOCATIONS

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
VOCs ANALYZED BY USEPA METHOD 8260  
RESULTS IN mg/kg (ppm)



0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

**KHM**  
ENVIRONMENTAL  
MANAGEMENT  
INC.

Surface Soil Analytical Results - BTEX, SVOCs, PAHs, VOCs  
October - November 1998, and February 1999

Willbridge Facility - Chevron  
Remedial Investigation  
Portland, Oregon

DATE July 2002

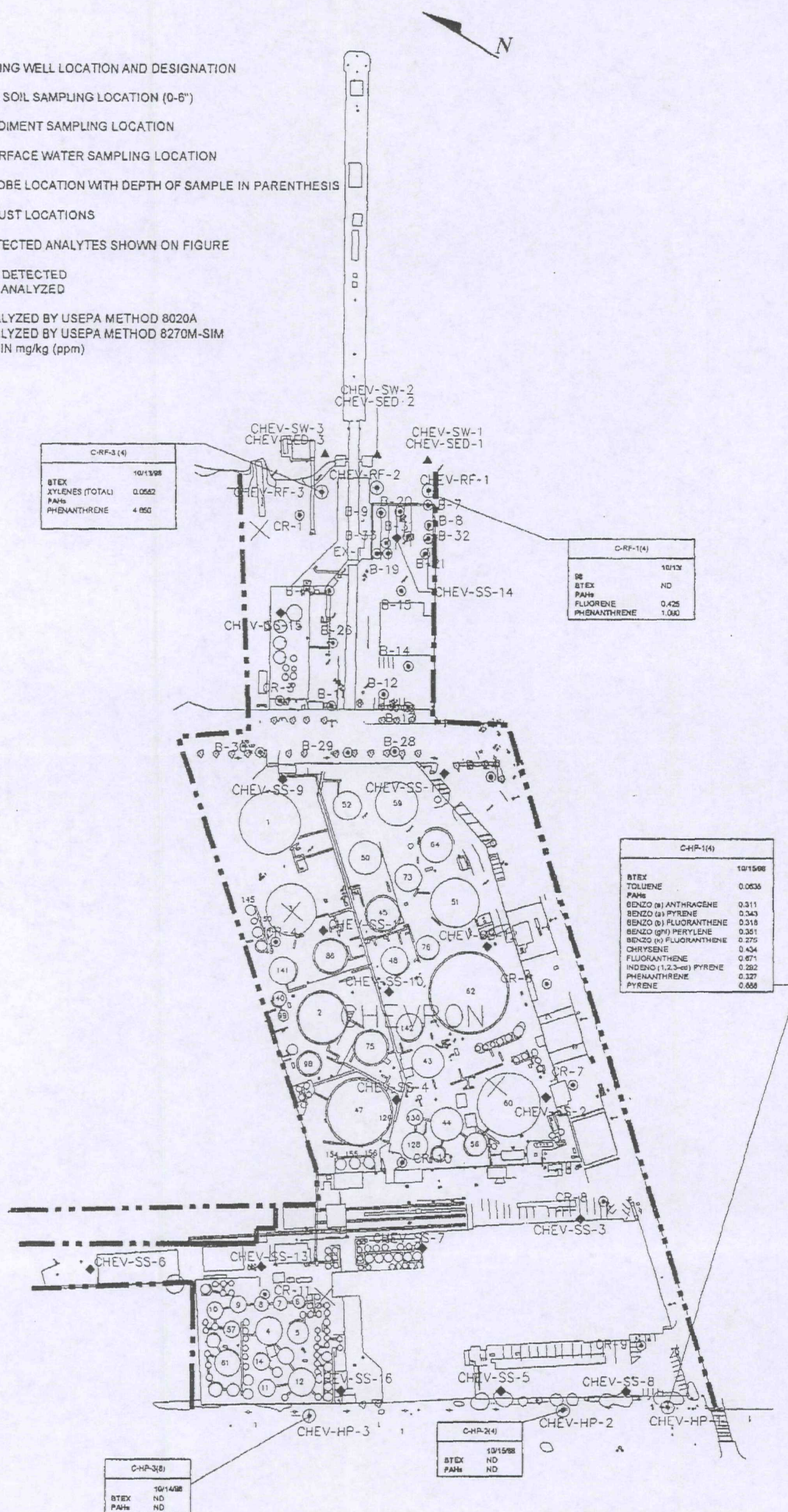
PROJECT

B17-01G

FIGURE 25



- LEGEND**
- B-1, CR-1 ● MONITORING WELL LOCATION AND DESIGNATION
- CHEV-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- C-HP-1(X), C-RF-1(X) ⊕ PUSH-PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS
- FORMER UST LOCATIONS
- ONLY DETECTED ANALYTES SHOWN ON FIGURE
- ND = NOT DETECTED  
NA = NOT ANALYZED
- BTEX ANALYZED BY USEPA METHOD 8020A  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
RESULTS IN mg/kg (ppm)



0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

KHM ENVIRONMENTAL MANAGEMENT INC.	Vadose Zone Soil Analytical Results - BTEX and PAHs October - November 1998		
	Willbridge Facility - Chevron Remedial Investigation Portland, Oregon		
DATE	July 2002	PROJECT	B17-01G
FIGURE	28		





LEGEND

- B-1, CR-1 ● MONITORING WELL LOCATION AND DESIGNATION  
CHEV-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")  
CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION  
CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION  
C-HP-1 (X), C-RF-1(X) ⊕ PUSH-PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS

FORMER UST LOCATIONS

ONLY DETECTED ANALYTES SHOWN ON FIGURE

ND = NOT DETECTED

BTEX ANALYZED BY USEPA METHOD 8020A  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
RESULTS IN mg/kg (ppm)

C-RF-3 (8)	
BTEX	10/13/98
PAHs	ND
FLUORENE	1.310
PHENANTHRENE	3.070

C-RF-2 (8)	
BTEX	10/13/98
PAHs	ND
BENZO (a) PYRENE	0.0876
BENZO (b) FLUORANTHENE	0.0970
BENZO (g,h,i) PERYLENE	0.131
BENZO (k) FLUORANTHENE	0.0793
CHRYSENE	0.0931
FLUORANTHENE	0.0960
FLUORENE	0.138
PHENANTHRENE	0.149
PYRENE	0.135

C-RF-1 (10)	
BTEX	10/13/98
PAHs	ND
FLUORENE	11.500
PHENANTHRENE	14.200

C-HP-1 (12)	
BTEX	10/15/98
XYLENES (TOTAL)	0.147
PAHs	ND

C-HP-3 (11)	
BTEX	10/14/98
PAHs	ND
BENZO (a) ANTHRACENE	0.0460
BENZO (b) FLUORANTHENE	0.0344
BENZO (k) FLUORANTHENE	0.0378
CHRYSENE	0.0646
FLUORANTHENE	0.162
PHENANTHRENE	0.110
PYRENE	0.192

C-HP-2 (12)	
BTEX	10/15/98
PAHs	ND

0 ft. 120 ft. 200 ft. 400 ft.  
APPROXIMATE SCALE

KHM  
ENVIRONMENTAL  
MANAGEMENT  
INC.

Capillary Fringe Soil Analytical Results - BTEX and PAHs  
October - November 1998

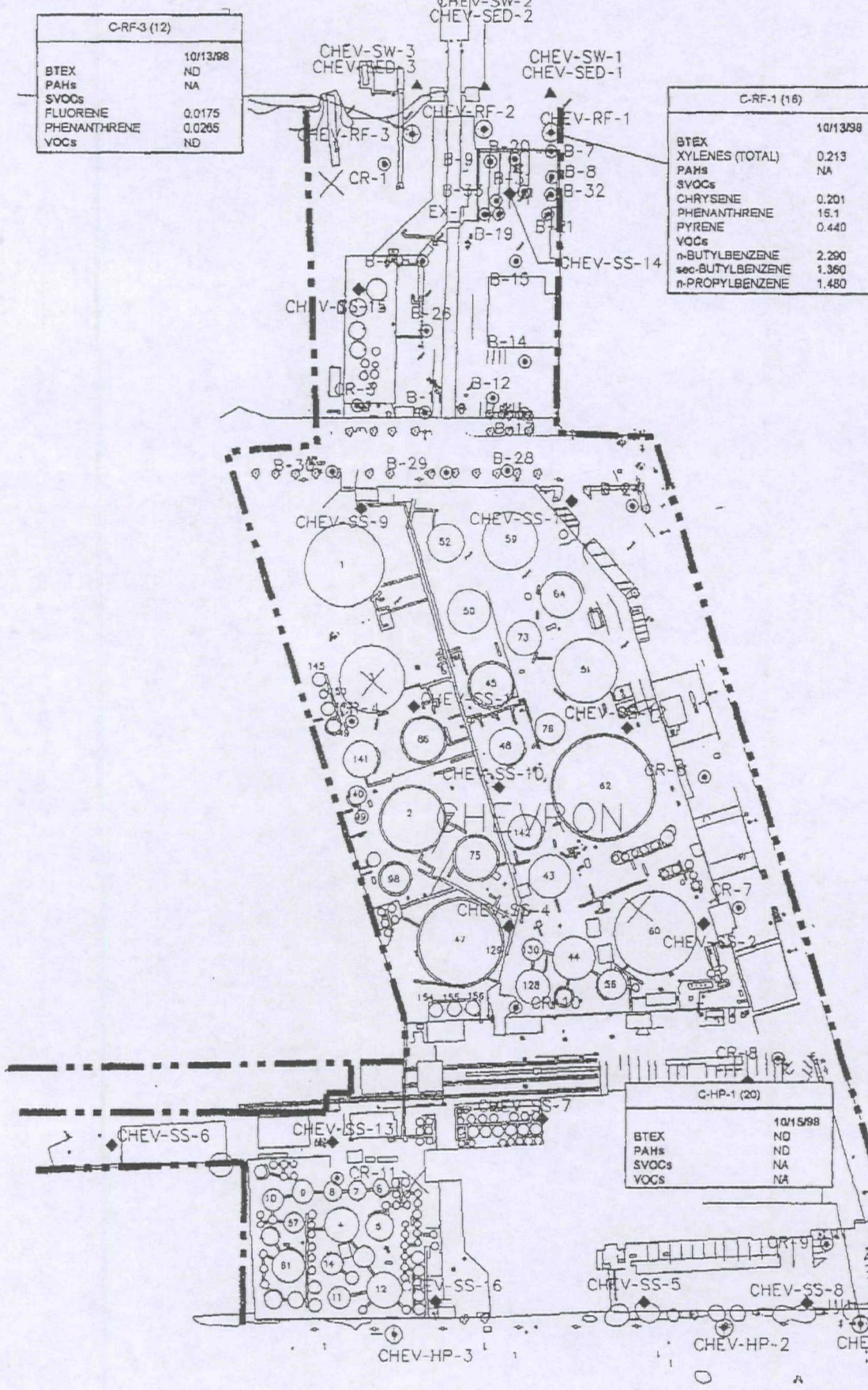
Willbridge Facility - Chevron  
Remedial Investigation  
Portland, Oregon

DATE July 2002 PROJECT B17-01G FIGURE 31



- LEGEND**
- B-1, CR-1 ● MONITORING WELL LOCATION AND DESIGNATION
- CHEV-SS-1 ◆ SURFACE SOIL SAMPLING LOCATION (0-6")
- CHEV-SED-1 ▲ RIVER SEDIMENT SAMPLING LOCATION
- CHEV-SW-1 ▲ RIVER SURFACE WATER SAMPLING LOCATION
- C-HP-1(20), C-RF-3(12) ⊕ PUSH-PROBE LOCATION WITH DEPTH OF SAMPLE IN PARENTHESIS
- FORMER UST LOCATIONS
- ONLY DETECTED ANALYTES SHOWN ON FIGURES
- ND = NOT DETECTED  
NA = NOT ANALYZED

BTEX ANALYZED BY USEPA METHOD 8020A  
SVOCs ANALYZED BY USEPA METHOD 8270/8270M-SIM  
PAHs ANALYZED BY USEPA METHOD 8270M-SIM  
VOCs ANALYZED BY USEPA METHOD 8260  
RESULTS IN mg/kg (ppm)



0 120 200 400  
APPROXIMATE SCALE

<b>KHM</b> ENVIRONMENTAL MANAGEMENT INC.	Saturated Zone Soil Analytical Results - BTEX, PAHs, SVOCs, and VOCs - October and November 1998		
	Willbridge Facility - Chevron Remedial Investigation Portland, Oregon		
	DATE	PROJECT	FIGURE
	July 2002	B17-01G	34



